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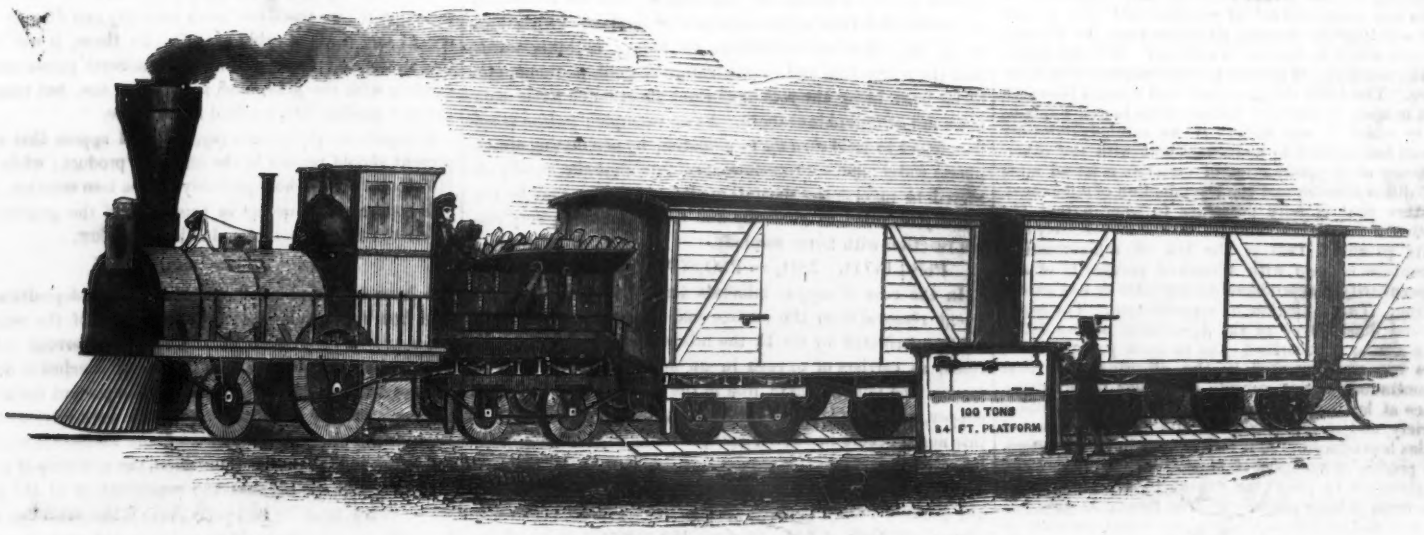
SCALES.

Accuracy in weighing is an essential requisite in every day's transactions, from the coal we buy by the ton to the homœopathic dose which may kill or cure, according as it turns the most delicate scale. With the single exception of the locomotive, scales have done more to facilitate business than any modern improvement or invention. Before 1830 platform scales were nearly unknown, most transactions by weight being confined to the even balance—the Dearborn beam and the steelyards of the Romans. They have wrought a revolution in almost every department of business requiring measurement of quantities in the sale, or exchange, or transportation of heavy bodies; in short, from the subtlest drugs and products in chemistry up to loaded vessels of 500 tons, everything is now weighed with unerring accuracy. The manufacture of scales, weights and balances is an important branch of business, and the variety we see on sale and in use is very extensive, indicating somewhat the amount of enterprise and mechanical skill which have been brought to bear in that direction. The accompanying illustrations represent railroad-track scales (Fig. 1) and cattle scales (Fig. 2), as manufactured by Fairbanks & Co. This firm has introduced an advantageous and economical improvement in the arrangement of tracks and switches pertaining to railroad-track scales, by substituting a second track over the scale, supported independently of the scale. The switches at either end of the scale are adjusted for passing the cars on the scale to be weighed—the locomotive having passed over the permanent second track in close proximity to the platform rails. When not desirable to use the scale, the switches are moved to connect with the permanent second track, over the scale, relieving it from all liability to injury from trains of cars passing over it. The plan originated with a practical railroad man, and has received the approval of many prominent railroad engineers. Fig. 2 represents an excellent method for weighing cattle. These scales are made to weigh cattle single or in droves up to fifty tons.

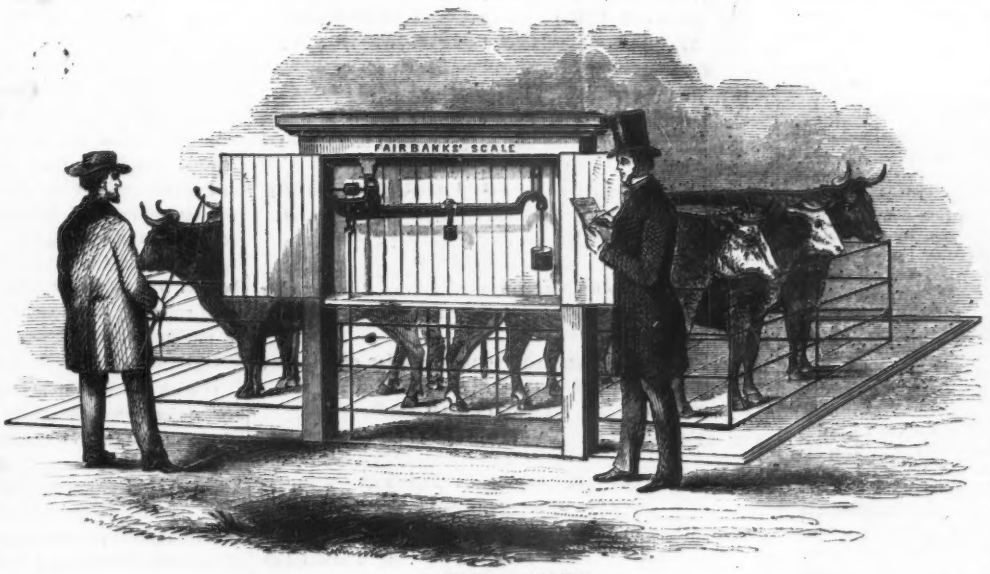
The works of Messrs. Fairbanks & Co. are at St. Johnsbury, Vermont, and are very extensive, giving employment to six hundred workmen. Within five years past the firm have built six large brick shops, which contain one and a half acres of flooring. From more than one hundred different varieties of scales manufactured by this Company, we may particularize the weigh-lock scales, used on canals; hay and coal dealers' scales, constructed with iron, with steel bearings, free from damage by water or weather; miners' and transportation scales, which are set in the ore-bed, warehouse, or elsewhere, for weighing freight, ore, coal, &c., and of which there are two sizes. The first size has a capacity of three tons, with a platform four feet nine inches by seven feet six inches; and the second has a capacity of two tons, with a platform five by six feet. Messrs. Fairbanks & Co. have extensive salesrooms at No. 252 Broadway, New York, where is exhibited, in every variety, a large stock of highly finished scales.

FIG. 1.



RAILROAD-TRACK SCALES.

FIG. 2.



CATTLE SCALES.

The Origin of the Needle Gun.

It sometimes happened that quantities of percussion-caps were sent back to Dreysee, having been spoiled by moisture. In order to prevent this, he conceived the idea of protecting them against dampness by covering them with a thin film of paper. The result proved to be the very opposite, for the paper attracted moisture, and a very large order which had been constructed in this way, was sent back to him, as they were entirely spoiled and unfit for use. This was a great loss to the firm, as copper was very dear at that time. In order to obtain the copper of the caps for further manufacturing purposes, Dreysee decided to remove the fulminating composition. In order to effect this with as little loss of time as possible, he wanted to do it by explosion. After various unsatisfactory attempts, the idea occurred to him of accomplishing it by means of a pin or needle, constructed for that purpose. This experiment proved to be entirely successful, and like lightning the idea struck him of using the needle altogether for exploding the cartridge. Not less quickly a second idea dawned on his mind, that of removing the entire explosive process from without to within the gun, and by inserting the explosive material into the cartridge, to save the the expensive copper used heretofore for caps. This was the first important step in the construction of the Prussian needle-gun. Dreysee immediately set to work, and in the beginning of 1829 the first needle-gun was made.

The Darwinian Theory of Development.

We are indebted to the N. Y. *Tribune* for the following condensed report of a lecture on this subject, recently delivered in this city by the Rev. Dr. F. A. Ewen, before the General Society of Mechanics and Tradesmen: Remarking that the present is a period remarkable for rapid progress and brilliant discoveries in science, the lecturer spoke of the slowness and difficulty with which all great discoveries are received by the popular mind, especially when they militate against established creeds and theories. Agassiz remarked that all new facts in science have to run a certain gauntlet; when first announced the public voice denounces them as impossible; when demonstrated to be facts, the cry is, "They are anomalies, contrary to the laws of nature;" when shown to be entirely in accordance with natural laws, we exclaim, "Oh, everybody knew that before." Thus it was with the discovery of the earth's motion. Thus when geologists showed that the typical six days of creation covered a much greater period of time than six times twenty-four hours, and the same when the announcement was made that the period of man's existence on the earth is vastly greater than 6,000 years. All these announcements were received at first with scorn and defiance, because they were contrary to what we had previously believed. It was not to be expected

that the promulgation of the theory that all organized creation had developed from very simple, and possibly from very few rudiments, would be accepted without considerable opposition and criticism. The speaker intended briefly to trace Mr. Darwin's theory, of the creation of organic life on the globe, and to present a few arguments to show the reasonableness of it. Scientists enumerate about 2,300,000 species of living animals and vegetables now on the globe. Add to these the external varieties of which traces have been found, and the total reaches about 10,000,000 different and distinct species of organized beings. These are divided for convenience sake into orders, classes, genera, species, and varieties. How come all these 10,000,000 variations here? The old belief has been that they all sprang into being instantaneously, and perfect as at present. Now, Darwin comes forward and declares that nothing now exists as it was originally created, but all existing living beings have come from a few simple primary forms, which have developed through all the intermediate stages up to their present state. How these primary forms first came into existence, he does not attempt to explain, nor is he at all bound to do so. Given, the existence of life upon the earth, he undertakes to show how all existing forms of life may have been produced. Some people may flippantly declare that they do not choose to accept a theory which gives them a monkey for an ancestor, but these same persons have always acknowledged a creed which ascribed their origin to a lump of mud, and, of the two, which is the least objectionable? Besides, this theory does not necessarily make man the successor of the monkey. The two developments may have progressed simultaneously from a common origin earlier than both. Divines may object that Darwin's theory is atheistic because it denies the intervention of a Creator in the existence of all these varieties of life, but does it? Does it not suggest a higher idea of a Creator who is eternally working through that operation of his laws, in producing constantly new forms of life, than if we regard him as one who, having at one period long ago back, expended all his power in one spasmodic act of creation, and then retired to rest, and contemplate through all future time the working of the machine which he has set in motion? Nor can we declare that the teachings of science are inconsistent with those of Scripture. The Bible declares that God created the earth and all that is upon it, and here science steps in and explains the mode in which it was done. If we carefully consider each, we shall find neither to be inconsistent with the other. Darwin's theory of the production of varieties is based upon the laws of differentiation and the reproduction of differences. Every creature that is born possesses to some extent the characteristics of its parents, and yet no one is precisely like either of its parents. This is the law of differentiation. When a creature is born with a marked peculiarity of any kind, that peculiarity is reproduced to a greater or less extent in its offspring. This is the law of reproduction. The lecturer gave sound illustrations of the operations of this latter law. When similar peculiarities exist in both parents, those peculiarities are more marked in the offspring. By thus breeding continuously from parents of similar peculiarities, the difference at last becomes so marked as to constitute a distinct variety, and may probably be still further projected until a species is produced. This fact is kept in view by stock breeders in producing varieties of stock. The lecturer cited several illustrations to show the extent to which we know such results to have been produced. The theory is sufficient to account for all the varieties which are found existing in the animal kingdom. The strongest argument which can be brought against this theory is the commonly received opinion that different species will not breed together so as to produce offspring; but this theory is not established. The fact that this does not occur does not prove that it cannot. It has been agreed that never in the history of man have we seen a species created or produced. But this is because these operations of nature are completed so slowly. In estimating the workings of nature, the element of time must be considered, and creation extends over a period of which the human mind is unable to conceive. If it be asked why geology does not show traces of these successive stages of development, the answer is that geology itself is but in its infancy, and that all the forces of nature are constantly at work to destroy the trace of her past labors.

Improvement in the Manufacture of Iron.

Mr David Stewart has lately patented a new method of purifying pig iron, or blast furnace metal, from its carbon, silica, sulphur, phosphorus, and other impurities. The improvement consists in subjecting molten pig metal or iron, direct from the blast furnace, to the action of oxygen, whether contained in atmospheric air, ozone, or other vapor or gas, by passing the metal in a stream or shower, either poured or forced upwards or sideways, so as to secure an intimate admixture of the particles of iron with the oxygen, or other gas or vapor containing oxygen. To effect this no special apparatus is required; but each manufacturer may vary the arrangement of his furnace to suit the mode of accomplishing the desired result.

Coal Mines in the Pacific States.

During the last year the only coal mines worked within the limits of the Pacific territory were those of Bellingham Bay and Monte Diablo. The amount extracted from the former was 8,816 tons; and from the latter, 71,322, making a total of 80,138. This amount is rather small and exhibits an unhealthy decrease when compared with the preceding year, the product of which was about 90,000 tons. The two principal companies at Monte Diablo have increased their facilities of transportation to tide-water by the construction of railroads, which, it is expected, will be attended by beneficial results to the consumer.

Explosive Powder for Blasting Rocks, &c.

Experiments have recently been made in a cutting for a tunnel at Milford between Nobel's nitro-glycerine and the explosive powder which is manufactured, without danger of decomposition a spontaneous explosion, by Mr. Horselly. The preference was given to the powder not only for its power when exploded in a particular kind of cylinder, but also for its economy, and its greater safety in use and storage. It requires a temperature of 475° to ignite. It has been tried and approved by the Admiralty, and is much liked by miners, who say they are afraid of explosive oil, and think gun-cotton useless.—*Chemical News.*

Original Papers.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

ON A THEORY OF GOLD GENESIS.

Being the Substance of a Memoir read to the AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, at the Buffalo meeting, August 1, 1866.

BY PROFESSOR HENRY WURTZ.

Continued from Page 114.

III. GOLD-GENETIC METAMORPHISM.

DISCUSSION OF THE SEVENTH POSTULATE: WITH SOME REMARKS UPON VEIN-GENESIS.—(CONTINUED.)

One essential point comprehended in the seventh postulate, which probably requires further elucidation, involves the reasons why the secondary sulphides, as recrystallized in the cavities, should be usually "richer in gold than the first." Two influences conduce to this, more or less.

FIRST.

The fact that it is comparatively rarely; in the oxidation and solution of any sulphide (and especially of those of iron) by oxygeniferous waters; that the whole of the metallic oxide formed enters into the solution. Of the numerous and highly important chemical questions here involved, there has as yet been little experimental investigation. I shall, therefore, strive to lay down, from the data presented in the products of these actions as found in nature, some general fundamental principles which may serve at least as starting-points in such investigations, to be followed up hereafter.

The great predominance in quantity of *iron* sulphides, gives to their history a paramount importance; and the probability is, indeed, that their metamorphoses are implicated with those of all the other more abundant sulphides; in other words, that the convection and concentration of gold, platinum, etc., is far from being the sole important function of ferric solutions in metamorphic changes. As an example; *galena* is seldom found to yield *directly* to oxidation by percolating atmospheric water; and its transformation into *anglesite*, usually observed to involve the separation of free sulphur, may be reasonably regarded as generally due to the following very simple reaction with ferric sulphate.

$$PbS + Fe^2O_3 , 3SO_3 = PbO,SO^3 + 2FeO,SO^3 + S.$$

In the case of *copper* minerals also, the fact of their frequent removal from the surface and concentration in depth, is also attributed by me to the intermediation of ferric solutions, as carriers of oxygen in an active and concentrated form. The implication of iron in the metamorphic history of copper, seems proved by the fact that comparatively little of this metal occurs in nature, except in combination or association with iron.

Hence the fundamental equations I present below, lie, without doubt, at the basis of nearly all the metamorphic transformations, both of the past and the present, in which the great "mineralizing" elements *sulphur* and *oxygen*, are involved; as they represent *type-formulæ*, at least, of the simpler transformations of the two most abundant and widely-diffused of the iron compounds of sulphur.

A. Transformations of pyrrhotine into pyrites,

(1), $3FeS + O^2 + HO = FeS^2 + Fe^2O^3 + HS.$

(2), $3FeS + O^3 = FeS^2 + Fe^2O^3 + S.$

(3), $3FeS + O^6 = FeS^2 + Fe^2O^3 , + SO^3.$

B. Transformations of pyrrhotine into ferrous sulphate.

(4), $3FeS + O^5 + 2HO = FeO,SO^3 + Fe^2O^3 + 2HS.$

(5), $3FeS + O^7 = FeO,SO^3 + Fe^2O^3 + S^2.$

C. Transformation of pyrites into ferrous sulphate.

(6.) $3FeS^2 + O^7 = FeO,SO^3 + Fe^2O^3 + S^5.$

D. Transformations of *pyrites* (always largely in excess, be it remembered, over the oxidating medium) into ferric sulphate.

(7). $4FeS^2 + O^{10} + 5HO = Fe^2O^3 , 3SO^3 + Fe^2O^3 + 5HS.$

(8). $4FeS^2 + O^{15} = Fe^2O^3 , 3SO^6 + Fe^2O^3 + S^5.$

(9). $4FeS^2 + O^{30} + 5HO = Fe^2O^3 , 3SO^3 + Fe^2O^3 + 5(HO,SO^5)$

Other important transformations of a more complex character, must at times have prevailed; some of which may be formulated as follows:

E. Transformations conducing to the formation of *magnetite*.

(10). $3FeS + O^9 + HO = FeO,SO^3 + Fe^2O^3 , SO^3 + HS.$

(11). $3FeS + O^{13} = FeO,Fe^2O^3 , 3SO^3.$

(12). $5FeS^2 + O^{28} = FeO,SO^3 + 2(Fe^2O^3 , 3SO^3) + S^3.$

(13). $5FeS^2 + O^{31} + 3HO = FeO,SO^3 + 2(Fe^2O^5 , SO^7) + 3(HO,SO^3).$

To these may be added one or two more.

(14). $2FeS + O^9 = Fe^2O^3 , 2SO^3$; or, a multiplication of this by 3, gives it the following much more probable shape:

(15). $6FeS + O^{27} = 2(Fe^2O^3 , 3SO^3) + Fe^2O^3.$

[Such systematic groupings of exact equations as the above, have suggested a number of new generalizations; but a few of which, however, can now be noticed. It must be remarked that I adopt the simplest view of the constitution of pyrrhotine; regarding this, in fact, as the most probable view, and attaching little importance to the excess of sulphur in analytical results, by reason of the usual association of this species with pyrites, which leads naturally to an explanation of this excess. If the view of GUSTAV ROSE be admitted, that pyrrhotine is Fe^7S^8, our equations would become so complex as to be exceedingly difficult of representation. It will be noticed, also, that I formulate the solid oxidated product, for simplicity, as anhydrous ferric oxide (*hematite*), but, in reality, it is oftener *limonite;* that is, formed by the appropriation of an equivalent and a half of water by each equivalent of ferric oxide. I have already shown how injected masses of the gelatinous hydrates of ferric or ferroso-ferric oxides may have been converted into beds of hematite or magnetite by heat convected from the depths below. Beds of *ilmenite*, as H. ROSE has shown, are due to substitution in hematite of ferric by titanous oxide; and beds of *chromic iron*, *franklinite*, and other homœomorphs of magnetite, admit of a like explanation.

The derivation of *chalybite* from *pyrrhotine*, which I have several times observed, involves considerations I cannot now dwell upon. I may here say, also, that equations (1) and (2) were presented by me before, in a paper read to this Association at the Baltimore meeting in 1858, to represent certain phenomena observed in the auriferous schists of the Carolinas and Virginia (*American Journal of Science*, Vol. xxvii., p. 31) and that I had, even before that time, presented unmistakeable examples of the same transformations, in reporting upon the magnetites of some New Jersey localities as at the apatite mine near Hurdtown. (*Report of the New Jersey Geological Survey for* 1855. *p.* 168.) The isolation of sulphur, indicated in several of these equations, I have often observed in cavities left by removal of sulphides in the talcose schists of the Carolinas, though the oxidating action has usually been carried further.]

Among the above equations, those which most especially concern us at present, are (7) (8) (9) and (15), these presenting types of the reactions most naturally and directly conducing to our mode of gold-genesis. In these, it will be seen, that in the first three, but half the mineral passes into ferric solution with the gold, and in the last one, but two-thirds; the rest passing into residual ferric oxide.

In equations (4) (5) and (6), it would appear that any gold present should remain in the insoluble product; while in Nos. (10) to (13), the whole probably passes into solution, and no gold-concentration occurs in this stage of the process; being deferred till the stage of reduction, as below.

SECOND.

I have before pointed out, that in the deposition of the gold from ferric solution, "the first stage of the reaction is necessarily a conversion of the ferric to ferrous sulphate." This, which involves one of the most conclusive deductive tests of the new theory, will receive important further applications. It may be stated also more precisely, as follows: During each alternate reduction of the auriferous solutions of sulphates, in the epochs of elevation, the new crop of sulphides would be richer; because the precipitation of the precious metal would tend to antecede that of the sulphide; and the first crystals deposited of the latter would enclose and carry down with them every molecule of gold in the liquid.

The accordance of these views may be here pointed out, with the fact that when iron minerals occur in large masses, or forming the predominant constituents of large beds, even in schists found elsewhere to be auriferous; such iron minerals are not often found to contain appreciable gold. As a few examples near home: the magnetite beds, passing into pyrrhotine in depth, of the Carolina schists (already referred to above, as described by me in 1858. *American Journal of Science*, Vol. xxvii. p. 30); the great beds of pyrites and pyrrhotine of the West Canada Laurentian, in which the new Madoc gold-field occurs; the great pyrites bed at Garthly, in the midst of the East Canada gold-field, etc. To these we may add the magnetite beds of Arendal, in Norway, near which place gold has been found in small quantities.

Gold-genesis is, in fact, a secondary process, slow, gradual, and intermitted; being clearly coincident, and connected with the operations that have gradually filled the cavities of the schists with the quartz and the magnesian silicates which constitute the most usual gangues of gold; whereas such great beds of iron oxides or sulphides have either been coeval with their enclosing rocks, or formed by some *continuous* operation of infiltration, or injection in gelatinous or pasty condition, ("segregation") from these rocks.

[I wish to add the remark, before leaving this branch of the subject, that the above general conception of the mode of metamorphism, or conversion of plastic porous beds of clays, sand, silts and gravels into rigid, compact crystalline schists; is by no means limited in my mind to rocks of this class, or of this early origin. The modes of compaction or cementation of the consituents of sandstones, conglomerates, shales, etc., of all ages, I believe to have been similar; and it will be seen further on that I find evidences of extremely similar operations, involving the same elements and general principles, even in our own day.]

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

MINING AND METALLURGY IN MEXICO.—V.

A SKETCH OF THE SYSTEM OF WORKING MINES AND OF EXTRACTING THE PRECIOUS METALS FROM THEIR ORES, AS PRACTISED IN MEXICO. BY DAVID COGHLAN, MINING ENGINEER, SCRANTON, PA.

Continued from Page 82.

The chemical explanation of the PATIO process has, though attempted by many eminent chemists, never been fully cleared up, or the different stages quite satisfactorily accounted for

I believe the changes through which the bodies pass are thought to be expressed by the following formulæ:

Salt and sulphate of copper to chloride of copper and sulphate of soda:

$$Na\,Cl + CuOS,O^3 = Cu\,Cl + NaOS,O^3.$$

Chloride of copper, mercury and silver, to subchloride of copper, subchloride of mercury (lost) and chloride of silver, afterwards to silver amalgam:

$$3\,Cu\,Cl + 3\,Hg + Ag = Cu^2\,Cl + Hg^2\,Cl + Ag\,Cl + Hg$$

and

$$Ag\,Cl + Hg = Ag\,Hg + Cl.$$

The quantity of silver present and the excess of mercury are not necessarily exactly represented by these chemical formulæ. The reaction producing Ag Cl is, however, important.

Silver in the state of chloride seems to be peculiarly favorable for amalgamation; hence the formation of this compound of silver is the great desideratum in amalgamation processes. This is gradually effected in the patio, and can be more rapidly done by roasting the ore with salt, though in this latter case some silver is lost, through the volatile nature of the chloride, as well as through the formation of antimoniate and arseniate of silver, should the ores be of a "rebellious" nature. These last compounds are not acted on by the mercury, and are consequently lost. The TORTA is trampled by horses every second or third day; and after about a week, generally, the first dose of quicksilver is absorbed by the silver, forming a dry amalgam.

The same rules are still observed in watching the phases of the process, as the amalgam when dry has the same colors as when in the liquid state. When it is sufficiently dry to yield no liquid mercury on pressing it, another dose of about one-quarter of the total quantity is administered, and the mass is again trampled. When this is solidified the remaining one-twelfth is added, and some add immediately before washing the torta, a considerable quantity of mercury, not for the purpose of amalgamation, but with the object of collecting with greater ease the small particles of amalgam scattered through the mud. The mud is then carried to pits with solid copper, stone, or wooden bottoms, to prevent the filtration of the quicksilver, and sides formed of water-tight planks about eight feet deep and the same across. In these revolve with velocity vertical rakes, which keep the water and mud in violent motion. The mud of the torta is thrown in, about a ton at a time, and water is let in also, until the vessel is filled. The motion of the rake stirs it up until the mixture assumes the consistence of muddy water. After being so stirred for two hours, the amalgam, by virtue of its great specific gravity, has all fallen to the bottom, and the muddy water is run off through a hole near the bottom of the vessel. A new quantity of mud is then thrown in, and this is repeated until the whole "torta" is washed. The amalgam, mixed with some coarse sand, remains in the bottom of the vessel and is washed in large wooden bowls three feet in diameter. The pure amalgam, being thus obtained, is strained in a canvas bag so as to separate the liquid mercury, and the dry amalgam remains in the bag. It is then moulded in triangular pieces of about twelve pounds weight. Some eighty of these masses are arranged in a circular pile, and put under a copper bell, the base of which is well luted with clay; a charcoal fire is lighted around the bell and kept at a red heat for twenty-four hours. The vapors of the mercury pass through a tube under the bell, into running water, and are condensed, while the pure silver remains. At the end of this time the bell is removed, and the silver, in a light and porous state, is extracted. This is cast into ingots or bars, of seventy-five pounds weight, and is so transmitted to the mint. There is a loss of quicksilver in the patio process, generally estimated at one and one-half times the weight of silver extracted. A fixed idea, among the persons in charge of this operation is, that an amount of mercury equal to the weight of silver is destroyed, owing to an unavoidable chemical change, without which the amalgamation could not take place, and that all loss beyond that is due to mechanical losses or bad management. The advantages of this system are, that great masses of ore can be operated on without any very costly machinery, and about ninety per cent. of the silver can be extracted from the common classes of ore. No fuel is required, except to burn out the mercury from the amalgam, and this in a country with a scarcity of fuel is important. There is a defect, however, which may render it difficult of application in some places—that it progresses favorably only when the temperature rises to seventy or eighty degrees, and in cold countries artificial heat should be applied. The consumption of quicksilver also forms a serious item of expense. This process lasts from ten to twenty days, according to the class of ore or the season of the year.

I have previously described the method followed with the common class of ore, but there are other sorts in which the silver is associated with blende, arsenic and antimony, which have only lately attracted attention and were formerly neglected as impracticable ores. If these are operated on in the usual way, the quicksilver is destroyed in a few days, and to keep up even a semblance of amalgamation, the use of enormous quantities of sulphate of copper is required. Burning out the obnoxious ingredients was the obvious remedy, as all of them can be volatilized at a red heat. This was first done in heaps, the ore being broken to the size of a walnut, and this for ores containg but a small quantity of these ingredients, is sufficiently satisfactory. Again, reverberatory furnaces were used, but it was found necessary to grind the ore fine for the roasting to have a proper effect, and the draught carried off much of the finer portions. Besides, the roasting was extremely unequal, except when managed with great care. At last a system was adopted which gives a most excellent result—it was the use of calcining (instead of reverberatory) furnaces, which have only come into use within the last ten or twelve years. The table on which the dried dust, resulting from the grinding in the "arrastras," and reduced to the fineness of ordinary flour, is placed, is formed of flat brick slabs, a foot square, which are rebated on two of their edges, so as to join, without permitting dust to pass through. These are supported on arches formed of bricks about four inches square, built parallel to each other, and a foot apart from centre to centre, so that the junction of each row of flat tiles rests on them, and the flames have free play from the furnace placed underneath. A dome of sun-dried bricks is made over the dust-table with an aperture on the top for the escape of the sulphurous vapors, while a chimney of very small diameter conducts away the smoke of the furnace. The economy of fuel over the reverberatory furnace is very marked, almost all the heat being usefully employed, which is very far from being the case in the reverberatory furnace.

Another advantage of the calcining over the reverberatory furnace, is that the heat being gentler, so great a volatilization of the chloride of silver does not take place. Palm trunks are mostly used as fuel, being very plentiful, and of but little use as fuel for other purposes. If such should be used for furnaces, not over one-half the amount of heat required would be generated. There is also very little loss of metallic dust in the calcining furnace, and the dust is equally acted on by the heat, no difference being observed in one part from any other. The advantage of this is obvious, as a small part of imperfectly burned ore mixed with the rest, will cause a loss of mercury and silver. The dust, after being sifted in cylinders of wire gauze, as fine as those used for flour, is thrown on the calcining platform and mixed with about five per cent. of salt ground fine and stirred at intervals with a rake, through a hole in the side. At the end of four to six hours, the greater part of the sulphur, antimony, arsenic and zinc is volatilized, and the hot dust is raked into a receptacle at one side of the furnace; when cool it is treated in the "patio" in the manner described under that head, except that the amalgamation must be kept slightly in the hot stage, which causes an additional loss of mercury. This again is almost always increased by the zinc, and other pernicious substances, which of course exist to a certain extent in the dust from imperfect burning; so that the loss of mercury by this system cannot, without great care, be kept within the limit of one and a-half times the weight of silver extracted. Another difficulty to be met with is, that if horses be used for trampling as with ordinary ores, their hoofs soon fall off, owing to the strong chemicals contained in the mineral. I obviated this by using a thick beam of wood with mortises and wooden teeth shod with iron radiating from the beam; these teeth being longer, the farther out from the centre of the "torta." They were inserted so as to form a circle, on being rolled round; this beam is attached to a horse arm, fixed to a pivot in a post in the centre of the "torta," and four horses are attached to the other extremity of the horse-arm, which extends outside the outer edge of the "torta." This being drawn around, causes the toothed cylindrical rake to revolve, and answers its purpose effectually.

The reader will probably find the description of this and the calcining furnace difficult to understand without a diagram, which would at once make their action clear. It will be seen that ores, to pay by this method of treatment, must be considerably richer than those beneficiated in the usual way. The mud from the "arrastras" has to be dried, which requires time and labor; then the calcining necessitates more time and is costly; the quantity of salt used is nearly double; the sulphate of copper is also considerably more, and the loss of mercury can seldom be kept within prescribed limits, as a slight want of care in calcining the ore makes a great difference; and for a process carried on night and day this is difficult to be remedied. All these cause an expense probably not much less than double the average of ores treated by the common method; so that I think in average districts, ores producing less than eighty ozs. a ton, cannot pay the expenses of extraction from mine and reduction. Another circumstance to be observed is that more than seventy-five per cent. of the silver really contained in the mineral cannot be counted on, owing to waste in the very many processes to which it is subjected, and still more to the partial volatilization of the silver, when in the shape of oxide and chloride; and the formation of compounds of silver arseniate and antimoniate, which cannot be acted on by the mercury.

[TO BE CONTINUED.]

On the Estimation of Lead by Precipitation in a Metallic State.

To estimate lead by this method, the author treats both soluble and insoluble lead combinations with zinc in the presence of water acidulated from time to time with hydrochloric acid; the reduction is effected at the temperature of the water-bath in a platinum capsule; the lead is deposited partly on the sides of the capsule and partly on the zinc, whence it is easily dislodged. When the reduction is complete, which is easily discerned by a clean surface of the zinc remaining brilliant in the liquid, decant and wash the spongy deposit of lead with water. As pure water might dissolve small quantities of lead, the author recommends an addition of a drop of sulphuric acid. After washing, dry the lead first in a water-bath, then at about 200°C. Even then its exact weight cannot be ascertained because it has undergone a partial oxidation. After weighing it, the oxygen absorbed must be ascertained, which may be done by Mohr's volumetric method—namely, by treating the lead with a weak standard solution of nitric acid. Wash the dissolved oxide of lead, and add a standard alkaline solution until it begins to produce turbidity. The quantity of oxide of lead is given by the difference in the standard of the nitric acid before and after its action on the lead.—BY M. F. STOLBA—*Chemical News.*

Mining Summary.

GOLD AND SILVER.

Nevada.

AUSTIN, NEVADA, February 6th, 1868.

EDITOR AMERICAN JOURNAL OF MINING:—

So many persons in the Atlantic States have been swindled by unprincipled mining operators, that it is now a very difficult matter to convince Eastern capitalists that there are any silver mines in Nevada worthy of their attention. When the Reese River lodes, with their wondrously rich surface ore, first attracted notice, the "wild-cat" speculators were determined to make money out of the discovery, either honestly or otherwise, just as the chances happened to turn. Their practice was to locate any little stratum of rich ore they could find in the Lander Hill belt, and make no inquiry as to whether it ever would, under development, become a mine, or in that event belong to them. Hundreds of claims were in this way located, where a dozen or two of the earliest discoveries completely covered the best mining ground. Having secured a series of locations, and prepared their bundles of title deeds, abstracts and vouchers, the speculative operators were the first to enter the New York market as the sellers of mining property. They were good judges of human nature, and made their mines appear of fabulous value, simply by asking for them the most extravagant prices. Strange as it may appear, they succeeded in many instances, merely on their own representations of the value of the claims, in realizing $50,000 to $60,000 for ground which was known to be utterly worthless. If, as in some cases, an inexperienced agent was sent to examine the property, it was only necessary to put forth a feeler as to his corruptibility, and if that failed of the intent, it was an easy matter to show him a series of gold mines as the ones offered for sale; and if, after the money was paid, it was discovered that the property reported on belonged to other parties, the matter was all right, as the desired result had been secured. Even where the mines were of a promising nature, exaggerated statements of their value were often made without the intention of fraud. The lodes were said to have such quantities of rich ore near the surface, that no outlay was necessary in opening them, the erection of quartz mills being all that was requisite to secure large returns in bullion. With the money at command to build an effective mill, some hair-brained dry goods clerk, or fast youth just from school, whose business imbecility made him of no account at home, was sent out to act as the company's agent. It seemed to be imagined that any body could manage a mine and mill in Nevada, particularly where the rich ore was so abundant that $5,000 a day in bullion would easily be taken out as soon as the mill could be set to work. Some mills cost $150,000 in gold and were anything but adapted to the work required of them. Owing to the necessity for development, work being in a great measure ignored, the mines failed to yield more surface ore than could be worked in a week or two, and the mills either under the action of the sheriff, or by orders from the East, had to be closed. If from the want of judgment and ordinary business caution the earliest investors in our mines became heavy losers, there is no reason in that why our mining property should be pronounced worthless, and undeserving of the moneyed interest. There is not a single instance of failure in the silver mines of Southeastern Nevada, where ordinary mining knowledge and sound common sense have had their sway in the selection of the property to be operated upon. If we take into account the immense increase made in the value of the Murphy mine of the Twin River Silver Mining Company during the last two years, and the amount of bullion it has yielded in the interval, the conclusion will be irresistible that there are few properties of any kind on the American Continent which intrinsically are of greater permanent worth. Four-fifths of this mine were bought in 1865 for $50,000 in gold, and since then a large expenditure has been made in opening the lode and building a large and effective mill. With a steady monthly yield of fifty to sixty thousand dollars in bullion, the mine is capable of paying handsome dividends to the stockholders. The present worth of the property cannot be estimated at less than $2,000,000, or about eight times the value of all the outlay incurred upon it, and with ordinary management it will pay even on this amount a clear monthly return of two and a half per cent. Or take the mines of the Combination Silver Mining Company of New York, at Silver Bend, as an illustration. Bought in 1866 for a few thousand dollars, they are now, after being partially developed and provided with a first-class mill, worth over $3,000,000. Take the price of the stock as a criterion, and on these figures they will give a handsome monthly interest. The mines, too, of the Manhattan Company of New York, situated on Lander Hill, were through mismanagement utterly unproductive a little over a year ago. The company had become involved in enormous debts, and at one time the property was in the hands of the sheriff. With a change in the agency and superintendence, the mines almost immediately became remunerative, and yielded during the last ten months of 1867 over half a million dollars in bullion. These are only a few of the many really safe investments which have been made in the country, and which, after sufficient time has elapsed to secure the opening of the mines, will add largely to the present yield of bullion. In a year or two more all the really promising undeveloped mines of Southeastern Nevada will be bought up by capitalists, and when developed the world will not only be astonished at the immense bullion yield, but at the fabulous fortunes realized by the operators who were far-seeing enough to invest when the country was young, and, through the absence of railroad communication, in an isolated condition. In giving your readers reliable description of the most prominent mining districts in this region of Nevada, I will on the present occasion confine myself to the well-known localities.

THE REVEILLE MINES.

This district, situated in a low range of hills 135 miles southeast of Austin, is justly celebrated for its rich surface ore. One ton from the Fisherman lode gave a pulp assay at the mill of $1,700, and several loads from the August claim yielded $900 per ton. It contains many mines of great promise, including the Fisherman group, Garden City, Highbridge, Aurora, Bolivia, Ottawa, Mediterranean, Baltic, and Indian Queen. These lodes, located in 1866, shortly after the discovery of the district, are still owned by the original locators, who have not the means to develop them. In the hands of companies able to expose its treasures, the Reveille would soon take its place as one of the best bullion producing regions of the State, and will, no doubt, soon receive the attention it justly merits. Water for milling purposes is obtained six to eight miles from the mines; and wood is plentiful

at about an equal distance from the water. The formation is a limestone having an imperfect crystallization, but in various places a felspathic granite crops out on the surface. and is no doubt the "country-rock" to which the lodes belong, the limestone being a cap of varying thickness in which the ore bursts out in the form of deposits of greater or less extent.

THE COLUMBUS MINES.

This is a mining district about 140 miles southwest of Austin, 30 miles from Silver Peak, 70 from Aurora, and 125 from Virginia City, the latter being the point from which the principal supplies are drawn. Its mines, though undeveloped, are unquestionably second to none in the silver mining State. Old practical miners, whose experience has been acquired in the Comstock range, have no hesitation in conceding to the great main lode of Columbus District the honor of being, in their estimation, the next mine to the unapproachable lode they take as their standard. There is one hill in the section which contains a great amount of milling ore, and all the best lodes seem to radiate from this as a centre. The veins belonging to the Mount Potosi group, as also the George Washington and Chloride lodes, show a good body of pay-rock on the surface, and are no doubt valuable mines. But the most celebrated mine in the region is the Northern Belle cropping out along its course for over 700 feet, with a width varying from 15 to 30 feet, and showing thousands of tons of ore ready, at a small expense for extraction, to be at once hauled to the mill. In the group there are two other claims—the Summit and Southern Belle ledges, which also show a considerable quantity of good ore. The vein matter of the Northern Belle is mostly a decomposed quartz, having such a singular appearance that were it not for the numerous assays made of it, varying from $100 up to $500 per ton, it might be thought a wholly worthless material. To give a fair milling test, 25 tons of ore taken as it came from an open-cut across the outcrop of the vein, were hauled 90 miles to the Knickerbocker mill in Union District, and worked by the ordinary process. The pulp assay of the batch was $123 per ton, which, though too low to suit the exalted ideas of the discoverers, or yield them a profit on the shipment, was yet a most satisfactory return for unassorted ore, of which there is an almost inexhaustible quantity at command. In the hands of an able company, having a well-appointed powerful mill convenient to the mines, the value of such a property as this can scarcely be over-estimated. For several years these mines have been held by the discoverers at very high figures, as they of all others best knew their value. Their means, however, being exhausted, they recently became more reasonable in their expectations, and gave W. R. Mackintosh control of the property, that he might make arrangements for its development. Mr. M. has gone East for the purpose of obtaining amongst his friends the requisite working capital, and will, no doubt, easily secure the end he has in view. The formation of the district is slate, nearly identical with that of the Silver Bend mines. Though the country is sterile and anything but attractive in its outward appearance, it is healthy and salubrious. Four miles from the mines there is a fine spring of water sufficient for a fifty-stamp mill. Wood is abundant ten miles off, and an extensive salt-bed is within easy reach. In my next communication I will give you a description of one or two other important mining districts.

CENDA.

Hot Creek District.—On the morning of February 5, according to the *Reveille*, the Mill belonging to the Old Dominion company was destroyed by fire, which was accidental and occurred as follows: to prevent the water in the supply pipe from freezing, an iron bucket filled with burning coals and cinders were placed near to it at a certain point during the night; and as the wind blew freshly during that night, it is believed that a coal of fire must have been blown out of the bucket against the dry woodwork of the building. Mr. Wakefield, the superintendent of the mill, who wrote this information to Mr. Montgomery, says that the machinery received little or no damage, but that the engine, battery and pans are standing apparently uninjured. The furnace stack is perfect. Mr. Montgomery estimates his loss at from $15,000 to $20,000. It is to be hoped that the mill will be rebuilt as speedily as possible, as it was rendering good service in developing several districts.

Reese River District.—The superintendent of the Plymouth company reports the striking of a ledge on the 6th inst., at the depth of 247 feet in the vertical shaft in Lander Hill. The *Reveille* says: It is believed to be one of the company's ledges, and exhibits six inches thick of fine-looking ore.

Newark District.—The *Reveille*, Feb. 6, says: Yesterday afternoon 14,000 ounces of crude bullion were brought into the city from the mill of the Centenary company in the Newark district. We learned that the bullion was produced by fourteen days' run of the mill.

Palmetto District.—Last evening, says the *Reveille*, Feb. 6, we had a brief conversation with one of a party that had just returned from a trip to Palmetto district by the way of Silver Peak, from whom we gather a few slight notes. Deep snow, it appears, had suspended all operations in the district, and completely isolated its residents. At one period of the winter the district was not supplied with a mail for four weeks, in consequence of the snow blockade of the White Mountains, over which the route passes from Aurora. Last week, when the party were in Palmetto, the snow was eighteen inches deep; and in Fish valley—a narrow strip of uncommonly fertile and productive land lying west of the district—it covered its entire surface. Before the snow-fall a Mr. Catherwood had thirty men employed in mining operations, but at the time of the visit of the party there was not so much as a man at work. Catherwood has opened several claims, one of which called the Silver Champion, has an incline or shaft 210 feet deep. There is valuable property in the district, of which the large, well-defined Kentucky ledge is conceded to be the principal. The ledge is from six to nine feet thick, and carries a compact mass of ore of very simple combinations. Tests and estimates place the average yield of the ore per ton at from $75 to $100. The owners have taken the initial steps to assure their title by applying for a patent. It is the prevailing opinion among those experts who have examined the Kentucky that it will become one of the leading and permanent silver producing mines of the State. Palmetto lies 175 miles due south from Austin, and about 25 miles in the same direction from Silver Peak. On their return some of the party stopped in the district and examined the reduction works of the Silver Peak and Red Mountain Gold and Silver Mining company, which are being built under the management of Josiah E. Clayton. These works are designed for reducing the gold ore from the Red Mountain ledges, from which they are distant about seven miles. Our informant was much impressed by the appearance of the mill even in its incomplete state, and believes it will not be surpassed in the State for simplicity of arrangement, efficiency and economy. Leaving Silver Peak the party came along Smoky valley to Austin, and were astonished at the unusual occurrence of snow over the whole route. During preceding winters it covered slightly the foot-hills, but it is now spread nearly over the face of the long valley.

Humboldt.—The amount of refined bullion shipped from the Montezuma smelting furnaces, for the year 1867, says the *Unionville Register*, amounted to $48,192, and the amount of crude bullion on hand the first of December, 1867, amounted to $63,057, making a total yield for the year of $111,229. This large yield of bullion is the result of not more than four months steady running during the past year, owing to the many hindrances and delays in getting machinery and material for the construction of furnaces on the ground. The next year, however, will witness a vast improvement in this respect, when the product of bullion will doubtless be more than doubled.....The same paper, of date Feb 1, says of the Monroe Series Mine: From personal examination of the developments being made, we found a large amount of work had been done since our last visit. Several hundred feet of tunnel have been run on the different levels and shafts sunk to unite them. The shafts and tunnels have all been run on the vein, thus demonstrating its depth and continuity. All the ore between the walls of the ledge is paying ore, and the ledge runs in thickness from six inches to two feet as far as explored. There is now enough work done to show conclusively that this company has one of the most valuable mines in this part of the State, and only needs a mill to make its property largely remunerative. The last ore worked at Holt's mill, at Winnemucca, yielded about $200 to the ton. A large quantity of the same kind is now out at the mine and is ready for reduction; but 20 miles distance is too far to haul ore for the purpose of milling, and hence the company will not work much more ore until it has a mill of its own—which it will have in the coming Spring.

Colorado.

O. J. H. communicates to the Central City *Miner's Register* the following, on the Consolidated Gregory mine. He says: "There has been considerable talk recently on the street and in the paper about this company; and as some false impressions have been given, I have, after consulting Mr. Hayes, examined into and written the following article concerning the affairs and condition of the company's property, which you will oblige me by admitting into your columns: At a meeting of the stockholders in New York, Jan. 8, H. G. Loomis was elected President, and Loomis, Parmelee, Moore, Gage, Isett, Harrington and Birch, Directors of the Company for the present year. Who the agent will be in Colorado is not known, but it is thought the company intend resuming work soon. The mine—500 feet on the Gregory, including the discovery claim—is in the best shape of perhaps any in the country. There would have been more ground opened ready for back-stoping, had not the exigencies of stockholders, on one or two occasions, caused the temporary abandonment of the systematic opening of the mine, pursued as far as possible by the mine captain, W. M. Rule. The main shaft is 6x11 feet in the clear, supported by 8-inch timbers in sets, once in three feet, from top to bottom, divided into separate shafts for pump and ladder way and hoisting. A 9-inch Cornish pump, in perfect order, capable of throwing out five times as much water as the mine ever made, and driven by an engine of ample power, insures the company against the difficulty, in that respect, encountered both east and west of them on the lode. There is still some unworked ground above the first level, 220 feet from the surface, in the west end of the mine. The second level, 300 feet from the surface, has been driven east to the adjoining property, 215 feet, above which the ground is about half taken down. It has been driven west 150 feet, and about fifty feet in length by thirty in depth stoped out. The shaft is now thirty-seven feet below this level, more than half way to the third level. In the bottom of the shaft the ore vein, assaying $200 a ton, is twenty inches wide and widening, and from this and the peculiar character of the country, Captain Rule is confident the third level will be in the stratum of ore from which the Black Hawk company, adjoining east, have taken so much money ($275,000,) during the past year. Both Mr. Hayes, general agent of the company, and Mr. Rule, feel sure the mine is in condition to pay a fair profit with stamps. Last fall Mr. Hayes was given permission to work it if he could do so, and meet the expense. He did so for two months, mining by underhand stoping, working at a disadvantage in many ways, drove a drift in wet, dead ground, (cap,) 15 feet, and sunk the main shaft twelve feet, paid his expenses, and applied about $4,000 on the old indebtedness of the company. Then it was thought best to shut down, as parties, not well informed as to the facts, were becoming dissatisfied with what seemed private use of company property. The mine is in charge of Mr. Rule, and it is safe to say it couldn't be in a better. The smelting branch of the company's business is not in so satisfactory a condition. It is, perhaps, problematical as yet, whether smelting is the most profitable treatment of our gold ores. It is certain that this company have not only not found it so, but directly the reverse. So did Lyon & Co. before them, and the Georgetown Silver Smelting Company behind them. May be it was too soon to attempt it—so far in advance of railroads. Doubtless many of the difficulties which the business has encountered were inherent in the condition and circumstances of the country; but I believe the incompetency of Dr. Johnson as a practical metallurgist was the greatest single cause of his three successive failures in smelting. It will be remembered that a little more than a year since, the furnaces built by Lyon & Co. passed into the hands of this company. They had been, and were left, under the sole management of Dr. Johnson. Lyon & Co. and this company employed him, supposing that he understood the business. With especial reference to his attempt to make regulus for this company, suffice it to say that he deceived the management both here and in the east, whether intentionally or not we do not know, the effect being the same, in either case, as to the value of the article made. It was not till they had occasion to sell this matte that they found it to be not more than one-third as valuable as had been represented. It was on account of smelting that the bulk of the expense of the last year was incurred. It can be saved, this year, by either dropping it, or by placing it in the hands of a competent man. No doubt the latter course will be taken, when the territory will learn, at least, whether smelting gold ores in Colorado at present is practicable. The financial management of the company's affairs has been in the hands of M. B. Hayes, and, as I said of the mine, I think it could not be in better. During his three years' stay in that country, he has become well acquainted with mining and milling, with business in general, and with the community, whose confidence he enjoys in a very high degree. He cannot justly be held responsible for the failure, so far, of smelting, which has been the great absorbent of the company's money. He is not a miner nor a metallurgist, but simply general business agent, and he has quite enough to do, too. I think I should but express the voice of this community were I to say that he is a prudent economical manager, of sound judgment. The country is to be congratulated on the prospect of a resumption of work by the Consolidated Gregory Company, owning, as it does, one of the best, if not the best mine in the Territory, which has added little to our gold production for the last four years. There is no reason why their mine should not produce as well as that of the Black Hawk Company, adjoining them, nor why, with the trouble and cost that have been incurred in opening it, it should not be worked at a good deal less expense. This, according to present indications, with stamps. If the smelting works can also be operated to profit, so much the better. It is almost certain that will be determined, beyond the peradventure of a doubt, within a few months." .....The same paper has the following: There were, at Clark & Co.'s banking house last night, 1484 ounces of silver, taken from six tons of ore from the Terrible lode. The average assay of the ores thus far taken out is nearly five hundred dollars per ton. We doubt whether any mine in the world can produce better ores. Some of those show an assay of over twenty thousand dollars per ton.....We have the pleasure of announcing that the Black Hawk Company have resumed work in their mine. They are repairing breakages as rapidly as possible, and soon all will be well again. This will give employment to many who have been out of work.....The Central City *Herald*, of Feb 15, says of the Susquehanna G. M. Co., who own 600 feet on the German lode. Their main shaft is sunk 200 feet, and is substantially timbered down 75 feet from surface in sets, size 5x10, divided into separate shafts for hoisting and ladder-way, We understand the last sixty feet has been sunk through cap, or we should say the main crevice was left. When reaching 140 feet deep, the lode split into two branches; the branch followed proved to be very small, in fact a mere seam, which caused much uneasy feelings to the person in charge. After reaching 102 feet, (leaving eight feet for a sink,) a drift was started west. For the first sixty feet the promise was anything but encouraging, but since the present contractors have been at work, they cut through the supposed wall, which resulted in discovering the crevice, which averages eighteen inches of solid ore. This has been drifted on for a little over fifty feet, and, we have no doubt, is the German lode proper. This drift is 112 feet from shaft; eight feet more will take them to the boundary line. A large stream of water runs through this drift, which has drained Mr. Kline's property so that he can work his mine (the German,) perfectly dry whenever he wishes to start in the bottom. No 2 shaft is 120 feet west, and is sunk 150 feet on the boundary line. This is an air shaft, and we understand it is the intention of the company to sink this shaft to connect with the level below, or rise from the present drift. After the connection is made the back will be stoped out. The mine is in good shape, and when No. 2 shaft is holed, considerable ore can be taken out. If they carry out the system of back-stoping, one stull will be all that is necessary to work away all the back in the mine, thus saving a never-ending expense in putting stulls every twelve or fourteen feet, such as may be seen in too many of our leading mines. This stull should be loaded with wall rock for the purpose of making the mine safe, and preventing any unnecessary work where horses have to do the hoisting. With the increase of water another horse has been engaged, as one is not able to keep the mine dry, and hoist the dirt from six men drifting. We understand they intend to sink another good shaft about 260 feet east of the main shaft, which, in our opinion, will be necessary, as 480 feet is too far to drift, and to pass all the dirt from the back-stoping, and furthermore, we don't think one shaft is sufficient for hoisting the dirt when this 600 feet is opened and worked to its full capacity. Air must also be conveyed to men working so far from the shaft. The ground is easily mined, and it will require a large engine to hoist the dirt from 100 miners, without making any calculations for a pump, which must eventually be put in this mine..... Messrs. Tomlinson & Lynn have leased the Bates & Baxter claims on the Bates lode. They have erected a whim, and have commenced cleaning out and re-timbering a portion of the shaft. They expect to begin raising ore in a few days. This claim has not been worked for some time; in fact, during the last two years, very little of any account has been done. We understand that when deserted, it was more than paying running expenses. .....Mr. Kip, agent of the Kip & Buell company, manages to keep the twelve stamp mill constantly employed. At present it is running on custom ore; six stamps on second quality Bobtail ore for Mr. A. N. Rogers, and six on ore from the Bates for Mr. G. K. Sabin .....Messrs. Warren, Hussey & Co. shipped $11,000 worth of gold to-day.....The Georgetown *Miner*, of Feb. 13, has the following items: The coming season will, in all probability, prove a busy one in mining operations, on the bars and in the bed of Clear Creek, from Spanish Bar to the lower end of our county line. A company is now engaged in sinking a shaft to the bed rock in the channel of the creek, in Spanish Bar district. They have an engine and pump in operation, and are making preparations to build a dyke to prevent high water from washing them out. The bars and bed of Clear Creek are very rich in gold, and prove a profitable source of employment to those who properly work them.....John Thackara, Esq., agent for a Philadelphia company, has been busily engaged, during the past season, in erecting works in Hugle Gulch, about five hundred yards from Clear Creek, in Spanish Bar district, for the reduction of the company's ores. The works when completed, will consist of suitable crushing works and arastras for re-grinding and amalgamation. Their capacity will be forty cords of ore per week. For the treatment of the surface gold ores of this county, the arastra cannot be excelled, as has been proven by years of trial.

Montana.

The success of Mr. Esler at Argenta, says the Helena *Post* of Feb. 8, has aroused a spirit of interest in regard to silver smelting that has long been dormant. Men have discovered that a moderate capital, seconded with energy, industry, and economy, can accomplish wonders, and silver smelting promises to be well tested the coming summer. Several gentlemen have already visited Argenta and new furnaces there will probably be the result. A company was organized here a short time since, and will have a furnace erected at Brandon, Mill Creek, in a few weeks, having some six thousand feet of good galena ore on Wisconsin Creek, and another company was organized at Mill Creek, on Saturday evening last, by Messrs. Harneth, Bower & Co., who have arranged to commence the erection of a furnace and buildings at once. These two furnaces will be near the old quartz mill, and have abundant water power with plenty of fuel convenient. The leads are situated, on an average, not much over half a mile from the site of the furnaces, prospect rich, have from two to five feet crevices, and sufficient galena to flux them. It is intended to have both in operation in three months. Parties have conveyed 1,100 feet of quartz to the latter company, who will commence smelting on the Passamari, Mayflower and Slider ores Mr. Harneth pronounces the Mill Creek district fully equal to those of Argenta.....The citizens of Nevada are about to erect a smelting furnace at a cost of about $5,000, for the purpose of testing the quartz in Nevada district, and are now receiving subscriptions to the fund.....The last shipment of bullion from Flint Creek, by the St. Louis and Montana Mining company, was in the vicinity of six thousand ounces. It was the purest lot of silver bullion which has been turned out, the whole of the bars assaying 970 fine, being a little purer than the stamped American silver coin.....Mr. Cope reports a rich strike on the Boaz lead, Hot Spring district, in a 90 feet shaft.....Flour is selling for $16 at Cover & McAdows's mill, Bozeman.....A new discovery of bar diggings has lately been made in McClellan gulch, opposite No. 9, below discovery. The bar is said to be very rich, the lowest prospect got on the bed rock being $1 50 to the pan. We learn from several gentlemen who have recently crossed the range that the prospect for good times on the "other side," this coming season, are generally good .....Mr. Geo. M. Pinney, who recently purchased the ten stamp mill of the Lost Lake company, situate in New York gulch, designs at no distant day to have it running.....The I. X. L.'s Co.'s eighteen stamp mill, on last Wednesday, cleaned up 296 ounces as the result of the last week's run.....The Union mill cleaned up, on last Saturday, over $4,000 from their last week's run.....A little sluicing is being done up and down the gulch, thereby practically proving that it is not so cold as it might or could be.....A correspondent thus writes in the Virginia City *Democrat*, of Feb. 8, of the silver mines of Argenta, and of Mr. Esler's reduction works: The excitement occasioned by the success of Mr. Esler, in reducing ores of the Rattlesnake district, shows that our people, notwithstanding the repeated trials and failures of Eastern professors, have some confidence in the mineral wealth of Montana. A recent visit to Bannack made it convenient for me, on my return, to spend a few days at Argenta—that unfortunate little village tha

rose and sunk with the fortunes of the St. Louis Mining company. Mr. Esler, dissatisfied with their operations, commenced in November last, under the direction of Mr. Rompf, a practical German miner, the construction of a small furnace, which, from the results already produced, proves beyond doubt the richness of the district, and that successful silver mining is within the means of the people of the Territory. It is a fact that in seventeen days Mr. Esler's furnace has smelted seventy tons of ore—producing at least fifteen of metal, and that from this metal five hundred pounds of silver will be obtained by cupellation, probably, before the close of another. The furnace is erected on the bank of Rattlesnake creek, a short distance above the village, and convenient to the ledges of ore. It is in every particular a primitive structure. The building is of logs; the stack contains 22,000 brick, which were burned on the plain in front of it, from the disintegrated granite that has been washed from the surrounding mountains. These bricks, equal in their resistance to heat, the best fire bricks of the States. The cupell furnace is built of them entirely; the smelting furnace is lined with a soft rock, found in great abundance in the vicinity, resembling, in its general character, the talc or soapstone of France. The strongest heat does not affect it, and it becomes hard by exposure. The water power consists of an overshot wheel, fifteen feet in diameter, which is kept in motion by about forty inches of water, conducted from Rattlesnake creek through a race, which is protected from freezing by a careful embankment of manure. This gives motion to the fan, which does the blasting for both smelter and cupeller, and affords waste power sufficient for several additional stacks that Mr. Esler proposes erecting during the coming season. The charcoal, of which eighty bushels is found to be sufficient to run the furnace for twenty-four hours, and smelt in that time, on a daily average, eight tons of ore, is delivered at the furnace for twenty-five cents a bushel. Six hands, at five dollars a day, currency, composing a night and day shift, of three each, manage the furnace. Mr. Esler has been working indiscriminately a great variety of the ores of the district—none of which yield to his treatment less than forty dollars to the ton, and several exceed two hundred. The ores are first thrown into heaps in front of the furnace, covered with wood and effectually roasted; then, after being cracked, they are mixed in proportionate quantities with iron, lead and other ores, until a proper flux be obtained and run through the furnace. The lead or metal is run off into cakes of the size of an ordinary milk pan. The cupelling furnace is a reverberator, the flames passing into it from the fire box adjacent. It is circular and of sufficient capacity to cupell from fifteen to twenty tons of the metal. All the preparation necessary for the process is to fill the lower portion of the furnace to the depth of about two feet, with clean pulverized lime rock, which is carefully tamped down. Each cake of the metal is held in the flame upon a fork, until it melts and runs down upon the lime—and the fire is then increased until the lead is burned, formed into litharge upon the top of the heated metal, and then blown by the blast to the door of the furnace, so that it can be readily scraped out from time to time, until all is removed, leaving a cake of pure silver at the bottom. A milder heat restores the litharge again to lead, and thus the whole process is completed. The building being kept open while the work is progressing, the workmen suffer nothing from the arsenical vapor which nearly proved fatal to Professor Stites in the St. Louis works. The cost of building a furnace, ready for operation, will not exceed, if it reaches, $5,000. In the Rattlesnake district, I regard it impossible that it should prove a failure. The ore is abundant there, and all remunerative. The same may be said of Boulder district where the ore is equally abundant and of the same character. Every material entering into the composition of a furnace may be found within a circumference of three miles from the mines, and the power is inexhaustible. It is safe to say that with his present stack, and other improvements contemplated by Mr. Esler, he will, during the next year, take out in silver and lead at least $250,000. Any man owning good property on the Rattlesnake or Boulder may approximate this by imitating his example. The chief difficulty to making such an enterprise a success consists in the danger of trusting it to unkillful hands. None but a miner who knows how to flux the ores, and regulate the heat of the furnaces, should attempt to take charge of the labor.

California.

Amador County.—The annexed items are from the *Ledger*, of January 25: At the Oneida mine last Sunday was "clean up" day, and it proved to be a good one. They have been running two weeks on what they term "prospect rock," and the result of the run was 615 ounces of gold, after being melted down by Peter Reichling, and is worth $11,800. There is no humbug about this; we saw the amalgam before it was melted, and then the "brick" made out of it. This is certainly encouraging to Morgan and every one interested in the welfare of our county. When Morgan took hold of this mine, it looked to one inexperienced as though it was "petered out," but by the right kind of management, and a systematic process of mining, it has become one of the best mines in California, and every day's work done on it but adds to its value. Pringle, who is now in charge, informs us that within the last few days, by drifting north, they have struck another vein of rock far richer than any yet discovered, and that the ledge is about fourteen feet wide. .....At Cat Camp we learn that the miners are all doing well, making from $2.50 to $10 per day to the hand, after paying for water. There are about three hundred white men and two hundred Chinamen at work there now, and the number will be increased as soon as a sufficient supply of water can be got in.....On Thursday last the Coney & Bigelow mill, at this place, was put in motion, after undergoing a thorough overhauling, and everything was found to work like a charm ....A vein of fine rock has been struck in the Tubbs mine at the depth of 160 feet, which has been assayed by different parties and found to be valuable.

Alpine County.—The *Miner*, January 11, says: We hear of a new strike in the I X L, of something larger and better than heretofore, but can get nothing definite in regard to it. The Tarshish is showing ore at every step. We learn that they have struck a large deposit of the rich, soft or sack ore in the Tarshish shaft, from which twenty-four sacks have already been taken and lots more in sight.

Calaveras County.—Seventy-eighty tons of quartz recently crushed at Hepborn & Co's mill at Railroad Flat, says the *Chronicle*, paid over $20 per ton.....The San Andreas *Register*, Jan. 11, says: Sixty tons of second grade ore recently crushed from the Petticoat mine at Railroad Flat, yielded $30 per ton. Thirty-nine tons from Thomason and Co's claim paid $9 per ton. Seventy-eight tons from Weihe & Sundermeyer's lead yielded $22 per ton. Grant & Paul's ore, from their mine near Grant's Ranche, yielded $7.50 per ton. The New York Co. have out about 40 tons that prospects about $40 per ton. Clark is piping away on his hydraulic claim.....B. K. Thorn has discoverod some exceedingly rich quartz near town. Several claims have already been located. Tho rock resembles the fine pay ore of Amador county. .....A West Point correspondent writes: Mr. Norman Harris, of San Francisco, has located a large section of gravel mining ground on the ridge above Sandy Gulch, and designs working it by the hydraulic process.

Lake County.—The Clear Lake *Courier* says: We learn from reliable authority that rich gold mines have recently been discovered about 30 miles north of this place, not far from the silver lode discovered a short time ago.

Mariposa County.—According to the *Mail* of Jan. 4, heavy damages were sustained by the Crown Lead during the flood. Their buildings, storehouse, blacksmith shop, and the house covering the quartz mill, were all swept away. The damage will be promptly repaired, and operations will be resumed in the spring.

COPPER.

Michigan.

The Lake Superior *Miner* of February 1 has the following: News came from the Ætna mine during the past week to the effect that it had stopped work for the winter. The mine was looking quite well in places, but the prospects were not encouraging enough to warrant the company to continue work. ..... We take the following from the Portage Lake *Gazette* of the 6th inst.: Yesterday the South Pewabic stamps crushed the largest amount of rock ever broken in one day by a single mill in the country—three hundred and twenty tons. The day before three hundred and eight tons of rock were broken. No efforts for a big day's work were made.....Friday or Saturday last the Calumet mill met with a serious accident, which will result in the laying up of one stamp for a couple weeks, possibly for the remainder of the season. The steam cylinder of one stamp was so badly broken that there is no possibility of repair. We learn they are to be loaned an extra cylinder from the South Pewabic, one sent up for experiment by Mr. Ball, but which has not yet been tried. The ingot copper product for the six months ending December 31 was 155 tons 25 lbs.....Work on the Calumet conglomerate has been commenced, and the belt found about sixteen feet wide and rich in copper. Two shafts are to be sunk, and the lode opened for mining. The show in the great amygdaloid continues as good as ever.....The December product of the Copper Falls was 120 tons, instead of 80 tons, the latter being the estimated product for January. The drift going on in the ash-bed to cut the old Copper Falls vein, it is calculated, is in within sixty feet of the vein. The ash-bed is particularly rich in coarse stamp copper, which is accepted as an indication that there is something better in the vein.....The following is the product of the Hancock for January:

Stamps	48,887 lbs.
Mass	4,510 "
Total	53,397 "

Or 24 tons, 397 lbs.

The following are the products of the Shelden-Columbian and Douglass mines for the year 1867:

SHELDEN-COLUMBIAN.

Month.	Lbs.
February	97,456
March	72,936
April	60,468
May	96,238
June	73,776
July	54.392
August	69,424
September	29,424
October	43,859
November	34,600
Total	632,812

Or 316 tons, 812 lbs.

Yield 85.3 per cent. of ingot copper. Worked but thirty to forty miners most of the year.

DOUGLASS.

Month.	Lbs.
February	12,011
April	39,515
June	15,188
September	20,135
November	5,630
Total	92,479

Or 46 tons, 479 lbs.

Four hundred tons of 3 per cent. stamp work not dressed. Worked from eight to fifteen miners during the year.

The Houghton *Gazette* of the 13th inst., has the following concerning the Shelden-Columbian mine: The operations of this company, since the decline in the price of copper, about the time of resumption of navigation last spring, have been confined exclusively to stoping away the better portion of the ground previously opened. In this mine there are three major copper courses, and two or three minor ones. The largest and most productive shoot is near the south end of the mine, lying mainly north of the Bloodgood and between it and Cutting skip shaft. This is about one hundred feet in length, the lode averaging fully twenty feet in width, and filled with good stamp and barrel work. Occasionally a small mass of a ton weight is taken out. Another good, but shorter shoot is that in which Banker shaft has been sunk, but from its dip now mainly lying to the north of the shaft. This course is about fifty feet in length and produces barrel and stamp work. A very rich and profitable shoot of ground, though of no greater extent than at Banker shaft, has been that opened just north of Stewart, or No. 1 shaft. The lode here has been very wide and rich in barrel and coarse stamp copper, and has produced heavily for the amount of ground broken. It is now being opened by the shaft and a winze ninety feet north, and by spring a rich block of ground will be opened for stoping..... The same paper says of the Huron: There are five courses or shoots of copper in the Huron, extending downwards from surface, between shafts Nos. 5 and 10, dipping slightly towards the south. At the first and second levels these shoots are separated by intervening bars or courses of poor ground as long as the copper shoots themselves. At the third level the poor stretches of ground have materially shortened; in the fourth level the shortening is more apparent still, especially between Nos. 8 and 9 shafts, while at the fifth level the shoots have so expanded in length as to blend, in some places, with each other, showing but about half the dead ground that was encountered in the first and second levels. The lode has been worked from twenty to thirty feet wide, it being considered a religious observation to follow it its entire width. The average is about thirty feet. The lode is divided, through the whole extent of working, by a belt of unproductive vein matter running so as to divide the lode into two parts, leaving in the foot wall side the widest and most productive in heavy copper, while in the hanging side, that portion is more generally charged with small copper, and stamp work. The unproductive belt thus obtruded in the lode is from four to twelve feet wide.....Space obliges us to curtail more than we would otherwise wish an excellent description of the Central mine, in the Lake Superior *Miner*, of the 8th inst.: The Central is one of those mines worked without regard to the stock market, and for the purpose of making profits by legitimate mining. Everything at surface shows that durability is the object aimed at, and seldom can a mine be found better equipped with machinery and necessary buildings, than the Central will be, when the engine now getting into position for hoisting at No. 4 shaft is in running order. Next month will find everything ready, indeed it is possible that the engine is being used at the present time. The principal working shafts are Nos. 2 and 4. These are on the line of the vein, 571 feet apart. No. 4 lies north of No. 2, and close to the outcrop of the Greenstone. It is sunk 35 feet below the 8th level, which is 751 feet from surface. No. 2 is sunk to the 9th level, or 727 feet from surface. Another shaft worthy of notice and which eventually will be of importance, is an incline, started at surface midway between Nos. 2 and 4 shafts and close to the abandoned shaft known as No. 3. This is complete to the second level. It is carried 14x7 feet, and dipping below the horizon at an angle a few degrees greater than the several belts of strata, will in all probability come down just right for the discharge of rock and copper from the north part of the mine, when the workings get too far removed from No. 4 shaft. No work is being done above the fourth level. The several levels below are opened respectively: 5th, 1,937 feet; 6th, 1,640; 7th, 1,346; 8th, 829 and 8th 43 feet. Nos. 2 and 4 shafts are communicated by all but the last-named level, that being only just started north and south from No. 2 shaft, and from a winze sunk under the 8th level, about midway between shafts. Retracing our way back to within 150 feet of No. 4 shaft, we heard that, to the ear of the miner, pleasant sound of copper cutting going on in the stopes below us. Before coming in view of the prostrate masses, the place was pointed out from which 200 tons of mass copper had been recently taken. On inquiring we were informed that the amount of ground stoped for this was about "thirty feet long and thirty feet high." The vein, or rather copper course, is about twelve feet wide. We are thus particular in giving details, as these may be taken as data on which to form some opinion of the amount of copper standing in the remainder of this block of ground. The 200 tons taken out may be said to be the end of a mass, for we were shown the place where it was attached from that now standing in the ground, by cutting. It exhibits a face four feet wide, reaching from the bottom of the level some six feet below where it is lost in the dirt. One feels inclined to ask how deep it holds down, but is hardly prepared when the ladder, by which the stopes below are entered, is reached. Descending about 35 feet, the sight that opens upon us baffles description. For a length of 50 or 60 feet, masses were standing, reclining, lying and hanging, of every size, from 50 to 60 tons, down. Twenty to thirty men were employed cutting them into blocks to send out of the mine. "Cuts," and "cross-cuts," were being made, varying from fifteen inches to three feet in depth, and for the most part in solid copper. One immense piece through which a cut has been put, is standing, awaiting further attention. We should judge that the "cut" is 15 feet in length, 5 feet of which, in the middle, will measure from three and a half to four feet across, solid copper, and apparently without a break. Such a piece of copper, seen in such a place, is something to refer to for a life time. The copper thrown out here, and in course of being cut up, cannot be less than 200 to 250 tons. Immediately adjoining this busy scene, another mass, or rather another of the continuation of masses, is uncovered, ready for blasting out. It would be difficult to estimate its size while in psition, but we hazard the opinion that it is good for 50 tons.

Mining in Canada.

REVIEW FOR 1867—BY PROFESSOR BELL, KINGSTON.

The year just closed has been marked by greater progress in the development of the mineral resources of the British Provinces than any preceding one. The following is a brief review of the state of mining and allied branches of industry in the order in which the localities occur, beginning at the West:

ONTARIO.

Silver ore and native silver have been discovered in promising quantities at Thunder Bay, on Lake Superior, and two companies have been formed for the purpose of working the mines. One of these, the Thunder Bay Company, has its headquarters in Montreal. The other, the Shuniah (Ojibway for Silver or Money) is an American company. It is is said that similar indications are found in one of the locations of the old Montreal Mining Company.

In 1866, iron mining was carried on at Gros Cap in Michipicoten Bay, but it has not been continued this year. At Batchawana Bay, the Peter Bell Company, after teaming a considerable quantity along the track which had been graded for a railway, to their wharf in the bay, abandoned their works entirely, removing everything except the railway iron which is piled up near the shore, and have commenced operations on a bed of hematite occurring near Arnprior on the Ottawa. The mountains of iron ore which lie a few miles behind the Peter Bell location at Batchawana Bay, are as yet unworked. New discoveries of valuable minerals in this neighborhood are reported,

At Begley's copper mine, an adit level has been run almost to intersect the main lode, which is large and apparently rich. The continued depression in the copper market has had a very unfavorable influence on the working and prospects of the mines yielding such metal. The cause of the slackness of demand for it is partly attributable to the general dullness of trade in England, and partly to the fact that wooden vessels are being to a great extent superseded by iron ones, and consequently less copper is used for sheathing purposes than formerly. Simultaneously with this absence of demand, comes abundance of shipments of the metal in the shape of bars and regulus from South America. From the 1st September to 2d October last year, the charters from Chili and Bolivia, were for 4,549 tons fine copper, and during the corresponding period of 1866, they were for 2,933 tons only. Many of the largest mines, such as the Cape Copper and Panulcillo, (in Chili) have been working to an enormous loss, and it is argued that they must reduce their production, in which case a better state of things may be expected this year.

On this account the Wellington and Bruce mines on Lake Huron have been worked to a smaller extent than formerly, and with a view of preparing the way for a more extensive production in future, rather than for immediate returns. A large number of miners have been recently discharged, and only between fifty and a hundred are kept at work—part of them at the old Bruce. The price of copper is now less than half what it was a few years ago.

Nothing is going on at present at the Wallace copper and nickel mine, nor at the iron mine immediately adjoining. There are rumors (some of them of a credible nature) of the discovery of gold in quartz on the Canadian side of Lake Superior and in dolomite immediately behind the Bruce mines. The old Upper Canada Mining Company is about to acquire new locations with the intention of carrying on operations next summer.

The attempts to find petroleum in paying quantities at Wequemakong on the Grand Manitoulin Island, have been given up, the prospects of success not being sufficient to warrant further outlay so long as the crude oil has little more than a nominal value.

The experiment of making salt from brine at Goderich has proved a success. One of the works produces about 600 barrels a week of excellent salt, and new wells are being sunk.

In Enniskillen the production of oil is as large as ever, notwithstanding the fact that all the small wells are closed. Petrolia is furnishing the largest quantity. Comparative dullness reigns at Oil Springs. So far, there is no prospect of an exhaustion of the oil in this region. It is believed by some that one of Mr. Macaulay's wells at Petrolia flowed as much per day as even the Shaw and Wilson wells, so famous in the early history of Oil Springs.

Bothwell has almost ceased to send any petroleum to market, although many of the wells would still produce a fair amount if the price were such as to make the oil worth the pumping.

The constant increase in the price of wood in Ontario has caused attention to be directed to the peat bogs at the mouth of Grand river, and of the Cataraqui at Kingston, as sources for the

future supply of fuel. A vein containing lead ore, near Peterboro', and another in Methune, to the north of Bellville, have been worked for a short time. The Tudor Mining Company, of Boston, have carried on their works in North Hastings, and the mine is improving in going down. Messrs. Hill and Kershaw, of Milwaukee, are also prosecuting lead and Bismuth mining in Tudor with commendable enterprise.

The rich magnetic iron ore at Marmora Lake is being worked with great vigor by the Cobourg, Peterboro' and Marmora Railway and Mining Co. The gentlemen composing it belong principally to Pittsburgh, Pennsylvania. They have between four and five hundred men at work. About half of them are French Canadians from Quebec. The ore is sent off during the summer at the rate of about four hundred tons a day, by way of Rice Lake and the railway thence to Cobourg. The mine, or rather quarry, is very conveniently situated. A village called Blairtown has sprung up at the spot.

The discovery of gold which was made in Madoc a year and a half ago has stimulated an extended search for the precious metal throughout the county of Hastings. It is said that in Madoc and the surrounding townships the farmers are digging six hundred holes. A stamp mill at the original Richardson mine is being erected and two others have been built in the same neighborhood. Joint stock companies have been set on foot at Belleville and Madoc, Toronto and Hamilton, with a view to mining for gold in this part of the country. Gold has also been found in quartz in Levant.

The attempts to find oil by sinking wells at different points north of the Bay of Quinte and at Waterloo, near Kingston, have all been given up as fruitless.

Probably the most important discovery in the way of new mines which has been made in Ontario, during the year, is the very recent one of an extensive vein of galena in the township of Loughborough, in Frontenac. The vein is described as being 12 feet wide and of great length, in the same course as those of Rossie, on the opposite side of the St. Lawrence. An association called the Frontenac Mining Company has been formed to work it, and Cornishmen have been procured from the Bruce, Wellington, Capel and Huntingdon mines. One of the shafts is down 30 feet. The vein is 13 feet wide at the bottom and expanding regularly. An adit has been driven from the side of a hill along the vein a distance of 120 feet. The ore is thickly disseminated through the whole mass in both the shaft and drift.

The Messrs. Chaffey Bros. continue to mine iron ore at Newboro', on the Rideau, and export it to Pittsburgh, Penn. An American Company have also been working an iron mine near the same place. The operations of the Peter Bell Company near Arnprior, have been already alluded to. Their prospects are very good. They have already raised several thousand tons of hematite of an excellent quality.

The Arnprior marble, which was used in the construction of the Parliament Buildings at Ottawa, was very much admired during the late session, and it is probable that it will come largely into demand in the future.

The preparation of hydraulic cement has been commenced by Mr. Rudd at his quarries in Pittsburgh, on the banks of the St. Lawrence.

Phosphate of lime, which is so valuable for agricultural purposes, is beginning to attract attention—not of our own farmers, however, but of Englishmen and Americans. Fifty thousand dollars are said to have been paid for a lot near Perth, and the mineral phosphate or apatite, has been mined in considerable quantities by Mr. Aspden, and sent to Manchester, where it is converted into the superphosphate. About thirty men have been employed. It is proposed to mine the phosphate on a neighboring lot, and send it in large quantities to the United States. It is converted into superphosphate principally by the aid of sulphuric acid, which is made from iron pyrites—a mineral occurring in large quantities, not far from the apatite, and might be very advantageously used in making this valuable manure in our own country. One of the deposits of pyrites in Elizabethtown has been worked, but the mineral has so far been sent out of the country. A large deposit of the bronze or magnetic variety has been discovered near Lynn and about a hundred tons have been quarried.

QUEBEC.

The rich deposit of magnetic iron in Hull, opposite Ottawa, continues to be worked with every prospect of success. The smelting is done by charcoal and wood. An excellent quality of iron is produced.

Plumbago or graphite has been worked by the Canada Plumbago Company of Montreal in Buckingham. An average of fifty men have been employed during the summer, and twenty in winter. A stamp mill has been in operation, producing a ton a day, worth about $120. The price has lately risen to nearly $200 a ton. In the adjoining township, the Lochaber Plumbago Company (an American one) have a mill in operation, and employed about forty men during the summer. Mr. Penoch, of Ottawa, has secured an important deposit of plumbago in the same township.

The discovery of Galena in Buckingham has, so far, not resulted in any profitable mining.

Gold has been found near L'Industrie, (in the Montreal District) in felsite, in the proportion of about $6 to the ton of rock.

The Canada Peat Company, using Hodge's process, have prosecuted their operations at La Pigeoniere. A good quality of peat has been manufactured, and used successfully on the Grand Trunk railway.

The works at Bulstrode, on the Arthabaska railway have been given up for the present.

Nothing whatever has been done at the Acton copper mine.

At the Melbourne slate quarry a new level has been opened. The produce of the quarry has been 30 squares per day during the latter part of the year, but latterly very much more. The quality continues to be all that could be desired. The Rockland quarry, west of the Melbourne, has been further developed. It gives employment to between 26 and 30 men. The Prince Albert quarry, still further west, is undergoing development, and employs about a dozen men. Two other quarries are also being opened in the neighborhood of Melbourne. In Granby a quarry of red slate is being opened, under the management of Mr. Thos. Frizell. An engine and cutting machine are to be employed. It is proposed to prepare slates principally for tiles and marbleizing.

At the St. Francis copper mine, near Richmond, nothing has been done. The copper mines near Lennoxville have been carried on notwithstanding the very low price of copper. At the Capel mine, managed by Captain Francis Bennett, 100 men on an average have been constantly employed. About 500 tons of ore per month have been prepared for the smelting works. The main shaft is now about 220 feet deep, and the main adit has been driven over 500 feet into the mountain. The smelting is a distinct department, employing 14 men, and managed by Messrs. Stanley & Son. They have been working during the greater part of the year, and in fall sent to the English market about 200 tons regulus of 40 per cent. as a first shipment.

The Belvidere mine, near the Capel, has been actively worked to within two weeks of the close of the year. Smelting works have been erected during the year under the superintendence of Mr. Thomas McFarlane.

The Lower Canada mine, adjoining the Belvidere, has given employment to about 25 men under Capt. Caswell. The ore at these mines consists of copper pyrites in mundic, and requires the same treatment at all of them. The production at the Lower Canada mine was 210 tons regulus of 28 per cent. At the Hasket Hill mine, three or four miles from Lennoxville, work continues to be done. The Albert mine sent to market 120 tons of ten per cent. ore, and produced 40 tons of regulus. From 15 to 20 men have been engaged. The Huntington mine in Bolton has employed about 30 men. Large crushing works have been erected, and about 2,000 tons of ten per cent. ore have been prepared for market. A new vein was discovered last spring, lying parallel to, and about 60 feet east of the vein upon which the shafts have been sunk. This new vein is reported to be from 8 to 10 feet wide, 4 feet of which on the foot wall consist of solid copper ore. The ore in both veins continues abundant at the depth sunk, (160 feet) and the length of ore ground exposed at surface is 970 feet.

Owing to the burning of all the buildings, except the engine house at the Harvey Hill mine, work has been suspended for the winter. The smelting works had been in operation a short time before the fire took place. A valuable discovery of copper is said to have been made in Inverness, and the mine is about being opened.

Some of these mines in the eastern townships are rapidly passing the mere exploratory stage, and now require to be opened in greater depth and with more perseverance than has hitherto been displayed. None of the shafts belonging to them are yet worked by anything better than a horse whim. Their depth and the amount of water collecting in them, render hoisting machinery and pumps worked by steam indispensable to their proper development.

In addition to the gold which has been known for some time to exist near Lennoxville, silver ore has been discovered about eight miles S. W. of the village.

On the Chaudiere, gold mining has been prosecuted by the DeLery Company. The property has been examined by Prof. Hind, and a crushing mill erected. It is proposed to subdivide the location among the smaller companies.

The low price of petroleum has prevented operations from being carried on in the oil region of Gaspe. From all accounts the prospects of obtaining flowing wells in this district are excellent, and all that is required to stimulate the search for oil is a better price for the article.

Attention has been directed to the deposits of iron sand on the north shore of the Lower St. Lawrence and the Labrador coast. Locations have been taken up at the mouth of the Moisie and to the west of it, at the mouth of the Natashquan, at Black Bay and other places. The sand occurs along a considerable stretch of the coast in the Mangan seigniory. It is reported that some hundreds of tons from various points have been sent for smelting via Lake Champlain to Troy and Albany. The Moisie Iron Company have erected smelting works and numerous buildings for workmen's houses and other purposes, forming a considerable village. The buildings are mostly whitewashed, and this once uninhabited coast has now a business-like appearance.

MARKET REVIEW.

FRIDAY EVENING, Feb. 28, 1868.

Gold and Silver Stocks—continue quiet. Consolidated Gregory has declined during the past week to $4,00 and is dull; Edge Hill is still advancing, and this afternoon touched $3 40; Rocky Mountain is quite weak at 25c.; Montana stronger at 60c.; Lacrosse, 60c.; Owyhee was sold yesterday at $20 00, to-day the quotation is $17 50; Combination Silver is steady, $50 being offered: Manhattan Silver continues strong at $150 00, and Twin River is now held at $85 00, an advance of $5 since our last issue. At the board the market was quoted as follows:

	Bid.	Asked.		Bid.	Asked.
Alameda Silver	1 00	1 25	La Crosse Gold	— 55	65
American Flag	— 65	70	Liberty Gold	— 4	5
Atlantic and Pacific	— 45	1 00	Manhattan Silver	150 00	— —
Bates & Baxter Gold	— —	1 00	Midas Silver	— 65	85
Benton Gold	— 33	40	Montana Gold	— 58	63
Black Hawk G	— —	5 00	New York	— 65	85
Bobtail Gold	1 25	2 00	New York & Eld'o	— —	1 75
Bullion Consolidated	— —	1 00	Nye Gold	— 2	5
Columbian G. & S.	— 3	8	Owyhee Mining	17 50	— —
Combination Silver	50 00	60 00	Ophir Gold	— —	2 25
Consolidated Gregory	4 00	4 05	People's G. & S. of Cal	— —	25
Corydon Gold	37	43	Quartz Hill	1 10	1 15
Edgehill Mining	3 30	3 40	Reynolds Gold	— 1	— 5
Gold Hill	— —	4 00	Rocky Mountain Gold	— 25	27
Gunnell Gold	1 00	1 20	Smith& Parmelee Gold	2 70	2 75
Gunnell Union	— —	45	Sonsenderfer	5 50	8 00
H'n G. & S. bs	— —	92	Symonds Fork Gold	— —	1 00
Harmon G. & S. bs	— —	3 50	Texas Gold	— 8	— 15
Holman	— 6	10	Twin Riv. Sil.	— —	85 00
Hope Gold	— 14	16	Vanderburg G	— —	75
Kipp & Buell Gold	— —	35			

Copper Stocks—Davidson declined to 45 to-day. Sales were made yesterday at 46. The general market for this kind of stock is dull and is thus quoted:

Caledonia C	— —	10 00	Hilton	— —	1 00
Canada	— —	— 50	Minnesota	2 50	4 00
Davidson	45	48	Ogima	2 00	— —
Gardiner Hill	— —	1 50	Rockland	— —	6 60
Central Copper	17 50	— —	Hancock Cop	5 00	— —
Copper Falls	19 00	— —	Isle Royale	—	5 00
Evergreen B. Copper		3 00	Knowlton	2 00	— —
Franklin C	9 50	— —			

Petroleum Stocks continue to command moderate attention. Bennehoff Run brought $1.90 to-day at the Board, and Buchanan Farm 39; United States is quite strong at $2.00. Quotations range:

	Bid.	Ask'd.		Bid.	Ask'd.
Bennehoff Run	1 75	1 90	N. Y. and Alleghany		3 00
Brevoort		40	Pit Hole Creek	90	1 15
Buchanan Farm	39	41	Rathbone Oil Tract Co		50
Central	35	50	Rynd Farm		10
Clinton Oil	75	1 10	United Pet. Farms		12
Manhattan		10	United States	2 00	2 20
National		3 00	Union	1 25	—

Miscellaneous Stocks—Quicksilver Mining, 23; Central Coal, 46; Rutland Marble, $11.00; Wallkill Lead, 32; Cumberland Coal, 30; Mariposa Mining, 7; Erie, 68⅜; Reading, 93¼; Michigan Southern, 90¾; Northwestern preferred 72¼; Rock Island, 96½; Adam's Ex. 74@74¼; American, 70@71; United States, 73@74; Wells, Fargo & Co., 40¼@40⅞; Merchant's Union, 35 per cent., 84⅜@85; P. M. S. S. Co., 113¾@113⅞.

Government Stocks are weak, and are thus quoted:

U. S. 6s, 1881, reg. 110⅛@111
U. S. 6s, 1881, coupon 110⅛@110⅞
U. S. 5-20s, 1862, regular 106⅛@106¾
U. S. 5-20s, 1862, coupon 110 @110¼
U. S. 5-20s, 1864, coupon 107⅜@107½
U. S. 5-20s, 1865, coupon 108⅛@108½
U. S. 5-20s, July, 1865, coupon 106¼@106½
U. S. 5-20s, July, 1867, coupon 106⅜@107
U. S. 10-40s, reg. 101⅜@ —
U. S. 10-40s, coupon 104¼@104½
U. S. 7-30s, June, large 106 @106⅛
U. S. 7-30s, July, large 106 @106⅛

Foreign Exchange is quite firm. Leading drawers ask 109¾ for sixty days' sterling, but no amounts of importance could be sold at better than 109¾. The following are the current quotations:

London, (prime bankers') 60 days' 109¾@109⅞
London, (prime bankers') sight 110⅛@110¼
London, prime commercial — —
Paris, (bankers') long 5.15 @ —
Paris, (bankers') short 5.12½@ —
Antwerp 5.17½@5.15
Swiss 5.17½@5.15
Hamburg (bankers') 36⅛@36¼
Amsterdam (bankers') 41⅝@41½
Frankfort (bankers') 41 @41½
Bremen (bankers') 79⅝@79¾
Berlin (bankers') 71⅛@72

Gold is quoted at 141⅛@141¾.

The steamship Cimbria from this port on Monday for Europe, took out $270,000 in specie, and the steamship Deutschland, on Thursday, $30,000.

Financial advices from San Francisco to February 10, give the following statement in reference to the shipments of treasure from that port:

Total since January 1, 1868	$3,825,998 27
Corresponding period of 1867	4,502,399 69
Decrease this year	$676,536 42

The following will show the exchanges on Thursday last at the New York Gold Exchange Bank:

Gold cleared	$87,819,000 00
Gold balances	2,190,816 89
Currency balances	3,125,615 59

American silver is still very dull at 7@8 cents below the price of gold. Mexican dollars are quoted at 102¾@103¼ in gold.

Money is in steady demand. Call loans range from 5 to 7 per cent., chiefly 6@7 for small sums, and only business paper of the highest grade can be sold at 7 per cent.

COPPER has been quiet but firm at 23¼cts. for Detroit; 23¼ for Portage and 23@23¼ for Baltimore. Sales of the week 300,000 to 400,000 lbs. each day; 100,000 lbs. Detroit for Export.

TIN unchanged 24c. for Straits; 23½ for English; 27c. gold, for Banca, without wholesale business.

SPELTER is firm 6½@6¾c., gold, for Silesian, with a jobbing business only.

LEAD, 6½@6¾c. gold, for foreign, with a moderate demand.

American pig iron has advanced to $38, for No. 1.

Scotch pig iron $39 for Eglinton, and $40 for Glengarnock.

PETROLEUM is quiet. Crude at 12c. in bulk and 17¼@17½c. in bond. Refined in bond at 25½c. for S. W. The above are the asking prices. Naptha is scarce and wanted.

Receipts for the week ending Feb. 25, 1868	pkgs	10,305
Exports for the week	galls.	424,181
do from Jan. 1st	do	6,181,547
do same time last year	do	3,539,197

THE IRON TRADE.

NEW YORK, Feb. 28, 1868.

The market in pig iron bears about the same appearance as last week. The demand for American continues moderate, while in the case of the Scotch, we hear of almost no enquiry. We note another advance in the price of the former. The sales of the week have not been numerous. We hear of 500 tons of new rails; 3,000 tons Grey iron; and 3,000 tons Allentown, @38,00. Nothing has been done in scrap or in old rails. In manufactured iron, the market is again dull, the briskness of last week having fallen away. Prices are firm and unaltered.

Weekly Statement of New York Imports.

The following table shows the quantity and value of iron and steel imports at the New York Custom House, for the week ending and including Feb. 21st, 1868:

	QUANTITY.	VALUE.
Chains and Anchors	85	$3 372
Iron, hoop, tons	5	199
Iron, Railroad bars	3,762	19,951
Iron, sheet, tons	40	4,268
Iron tubes	450	1,145
Iron, other, tons	1,604	85,998
Steel	3,385	74,403
Total value		$139,336

Boston Imports of Pig Iron from January 1 to February 22, 1868.

	1868.	1867.
From Great Britain, tons	1,313	6,720
Coastwise Ports	3,144	404

Lehigh Valley Iron Trade.

The following table shows the amount of Pig Iron transported over the Lehigh Valley Railroad for the week ending Feb. 22, 1868:

From	Tons.	Total
Carbon Iron Co.	330	1,910
Lehigh Valley Iron Co.	310	1,850
Thomas Iron Co.	840	4,480
Lehigh Crane Iron Co	280	2,160
Allentown Iron Co.	100	475
Robert Iron Co.	410	1,800
Glendon Iron Co.	650	3,020
Other shippers	320	872
Total	3,240	16,567

Product of the Marquette, Mich., Iron Furnaces for 1867.

The following table exhibits the total product of Ore and Pig of the Marquette furnaces for 1867. We have previously given the total shipments over the principal route of transportation, but the subjoined table will be found more explicit and comprehensive.

IRON ORE.	Tons.
Jackson Iron Co.	126,291
Cleveland Iron Co.	75,822
Michigan Iron Co.	7,827
New York Iron Co.	47,000
Lake Superior Iron Co.	120,178
Pittsburgh & L. A. Iron Co.	46,607
New England Mine	9,075
Edwards Mine	4,980
Washington Iron Co.	25,440
Iron Mountain Iron Co	5,000
Iron Cliff (estimated)	1,000
Total Iron Ore	469,320

PIG IRON.	Tons.
Greenwood Furnace	5,329
Morgan Furnace	5,050
Michigan Furnace	4,131
Collins Furnace	4,630
Bancroft Furnace	3,051
Pioneer Furnace (2 stacks)	6,980
Northern Furnace	1,730
Total Pig Iron	30,911
Total Ore and Pig Iron	500,231

Market Prices.

NEW YORK, Feb. 28, 1868.

DUTY.—Bars, 1 to 1¼c. per lb.; railroad, 60c. per 100 lbs.; boiler and plate, 1¼c. per lb.; sheet, band, hoop and scroll, 1¾ to 1¾c. per lb.; pig, $9 per ton; polished sheet, 3c. per lb. Payable in gold.

Anthracite, No. 1, best.	$39 00@37 00
" " 2x, fdry,	37 00 35 00
" Grey Forge,	31 00 33 00
Scotch Pig, from yard	40 00 42 00
Charcoal, coal blast	50 00 60 00
Old Wrought sc'p, fm yd.	43 00 — —
" " " fm. vsl.	40 00 — —
English rails, gold	52 00 53 00
American " at works	75 00 78 00
Old Railroad Iron	45 00@ —

JOBBERS' PRICES.

Hoops, ¾ per ton	$185 00
" ¾ "	155 00
" ⅝ "	145 00
" 1 "	135 00
" 1¼ "	130 00
" 1¼ to 2 per ton	130 00
Scroll Iron—¾x14 per ton	170 00
" 12 "	160 00
" 10 "	150 00
" 3-16 "	140 00
" ¼ "	132 50
" ¾x14 "	150 00
" 12 "	147 50
" 10 "	142 50
" 3-16 "	132 50
" ¼ "	127 50
" ⅝x14 "	140 00
" 12 "	137 50
" 10 "	132 50
" 3-16 "	127 50
" ¼ "	125 00
Swed'h I'n, ord'y sizes, ⅞ to 2 in. sq., per ton	150 00
Swedish—common ass'd	$150@155
English—com	85 90
do refined	95 100
do sheet, per lb	6½@10c.
Russia, sheet	15@16c

Swedish Iron.	
1½x¾ to ⅝ and ¾ in sq.	155 00
1¼x¾ to ⅝	160 00
6 to 12x¾ to 5-8	160 00
Common Iron	
¾ to 2 in. round and sq.	85 00
Refined Iron.	
¾ to 2 in. r'd and sq.	90 00
1 to 6 in. wide x ¾ to 1 th.	90 00
3¼ and 3½, round and sq.	100 00
Rods—5-8 and 11-16, round & sq., per ton	100 00
½ and 9-16 round & square	105 00
7-16, round and square	115 00
⅜, " "	120 00
5-16, " "	125 00
¼, " "	130 00
3-16, " "	160 00
Horse Shoe Iron	125 00
Band—1 to 6 in. x 3-16 to No. 10	125 00
Ovals and half Rounds.	
¾ to 1¼	120 00
⅝ & 11-16	125 00
½ & 9-16	130 00
Nail Rods, per lb.	
"	9@10½
Norway Shapes	8½c
Spring Steel	10@10½
Tire " ¾ to 1¼x1¼ & 5-16	10¾c
Toe Cork Steel	10¼c
Sleigh Shoe Steel	10½c
Plow Steel—6 to 14x¼ to ⅜	10c

BOSTON, Feb. 26, 1868.

Scotch Pig, No. 1	
Gartsherrie	$42@43
No. 1, other brands	39 42
American, No. 1	40 45

PITTSBURGH, February 22, 1868.

A fair degree of activity is maintained in raw iron, which is especially true of standard forge descriptions. The sales of the week, although not large, indicate a fair aggregate of business, and towards the close the tone of feeling was more firm, with negotiations pending for lots of considerable magnitude.

Foundry descriptions continue excessively dull, including the entire range from inferior coke to the finest charcoal grades. Receipts of all descriptions continue light.

The week's operations were 2 971 tons, as follows: Bituminous, 2,420 tons; Anthracite, 451 tons: Coke, 100 tons; Blooms, 55 tons.

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.

250 tons Inferior White Forge	$34 00—4 mos.
250 tons Inferior Mottled and White	34 50—4 mos.
100 tons Close Gray Forge	36 00—4 mos.
100 tons Medium Forge	35 25—cash.
100 tons Open Gray Forge	38 00—90 d'ys
500 tons Medium Forge	35 00—cash.
200 tons Open Gray, deliverable at furnace	36 00—cash.
40 tons Inferior, at furnace	32 00—cash.
50 tons Open Gray	37 00—4 mos.
650 tons Mahoning Valley Forge	private terms.
70 tons " " low grade	35 00—5 mos.
70 tons " " "	35 00—5 mos.
40 tons " " No. 1 Foundry	43 00—4 mos.

ANTHRACITE.

40 tons Forge	$37 50—5 mos.
20 tons Forge extra	38 75—cash.
40 tons Foundry	39 00—6 mos.
50 tons Neutral	37 50—6 mos.
150 tons Neutral Forge	37 00—cash.
30 tons " "	39 00—cash.

21 tons No. 1 Foundry..... 44 00—4 mos.
70 tons No. 3 Anthracite..... 37 50—4 mos.
30 tons No. 2 " ..... 40 50—4 mos.

COKE.

100 tons Extra Forge..... $37 00—cash.

BLOOMS.

20 tons No. 1 Juniata..... $92 50—4 mos.
25 tons " " ..... 90 00—4 mos.
10 tons " " ..... 92 00—4 mos.

THE COAL TRADE.

NEW YORK, Feb. 28, 1868.

Business in the early part of the week was quiet, consequent upon the approaching Scranton sale of Wednesday. The many small dealers out of town who were disappointed in getting their supply at the sale of lump and steamboat, however, came later in the week, causing some activity.

The Scranton sale was well attended, the bidding was spirited, and, as we predicted, an advance in prices was obtained, as will be seen by the annexed report:

AUCTION SALE OF COAL.

The 59th sale of Scranton coal was held on the 26th inst. by John H. Draper & Co., auctioneers, at the office of the Delaware, Lackawanna and Western Railroad Company, No. 26 Exchange Place.

	February 26th, 1868.
9,000 tons lump	— @$3 45
9,000 tons steamboat	— @ 3 80
10 tons grate	4 25 @ 4 40
5,000 tons egg	4 27½@ 4 57½
12,000 tons stove	5 12½@ 5 25
5,000 tons chestnut	3 90 @ 4 00
	January 29th, 1868.
4,000 tons lump	$3 45 @ 3 55
6,000 tons steamboat	3 45 @ 3 60
7,000 tons grate	3 67½@ 3 87½
4,000 tons egg	4 00 @ 4 15
3,000 tons stove	4 90 @ 5 05
16,000 tons chestnut	3 62½@ 3 85

Mr. Clark, of Providence, purchased the 9,000 tons of Lump in one lot, and W. H. Talmage & Co., of this city, the steamer.

Freights remain unchanged, the facilities for shipping not having improved.

Samuel Bunnell, Jr., drew up a petition to the Morris Canal and Banking Company, which has been signed by our leading merchants, to have the tolls on the Canal made "nett," doing away with the system of drawbacks, which is not only unjust but troublesome. While we heartily agree with the petitioners in their application, yet we have no hope that the corporation appealed to will grant their request. It has proved too profitable to be dispensed with so readily. We shall have more to say when we see what action is taken in the matter however.

Messrs. Caldwell, Gordon & Co. have removed from 111 Broadway to their new and spacious offices, No. 35 Pine street, where they will be pleased to meet their old friends and customers. Pine street is destined to be the great Coal market of this city, and others would do well to refuse to pay the exhorbitant rents charged at 111 Broadway, and secure eligible offices in this location.

Messrs. White, Fowler & Snow, late John White & Co., have been making an addition to their former facilities for transacting business, and have now one of the finest offices in Trinity Building. This is a young and enterprising concern, and well deserves the success it has met with.

The following table exhibits the quantity of Coal passed over the following routes of transportation for the week ending February 27, 1868:

	1867.		1868.		INC. OR DEC.	
	WEEK.	YEAR.	WEEK.	YEAR.	WEEK.	YEAR.
Phil. & Reading R. R.	48,074	385,446	44,779	430,164	d 3,295	i 44,728
Lehigh Valley R. R..	25,998	219,174	39,328	405,398	i 13,330	i 185,224
Scranton North.....	6,218	45,859	7,667	60,760	i 1,449	i 14,901
" South.....	24,071	157,817	19,547	148,568	d 4,524	d 9 249
Penn'a Coal Co. Rail.	8,192	38,537	4,055	79,638	i 4,137	i 41,101
Shamokin.....	5,683	44,093	8,143	44,644	i 2,460	i 550
Trevorton.....	766	3,866	731	4,270	d 35	i 404
Short Mountain.....	482	3,535	787	4,652	i 305	i 1,117
Lykens Valley C. Co.	.....	3,559	.....	10,391	.....	.....
Broad Top.....	3,219	23,306	3,310	19,843	i 91	d 3,463
W'mstown Col'y, E..	.....	8,015	.....	15,411	.....	.....
Total.....	.....	933,207	.....	1,223,739	.....	.....
	.....	.....	.....	933 207	.....	.....
ncrease.....	.....	.....	.....	290,532	.....	.....

Schuylkill Coal Trade.

BY RAILROAD, FOR WEEK ENDING FEB. 27, 1868.

St. Clair	572
Port Carbon	4,245
Pottsville	877
Schuylkill Haven	16,377
Auburn	423
Port Clinton	14,161
Total for week	36,655
Previously this year	430,164
Total	466,819

Cumberland Coal Trade.

From the Alleganian.

By B. & O. RAILROAD.—The shipments over the Baltimore and Ohio Railroad, for the week ending Feb. 22, were as follows:

From Cumberland & Pa. R. R.	
Consolidation Company	137 07
Borden do.	207 04
New Hope do.	298 08
Midland do.	....
From George's Creek via Piedmont.	
George's C. & I. Company	472 04
G. & M "	97 07
Central "	1,036 02
Atlantic "	379 13
Piedmont "	144 01
Swanton "	361 18
Potomoc "	1,306 14
Franklin "	46 02
George's Creek Mining	11 18
Hampshire "	1,378 11
Total	5,877 09
From Eckhart Railroad.	
C. C. & I Co	1,252 01
Total	7,129 10

[NOTE.—For the week ending February 8, there were shipped from the Piedmont region 2,908 16 tons.]

Lehigh Coal Trade.

SHIPPED BY RAILROAD FOR THE WEEK ENDING FEBRUARY 22, 1868.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVIOUSLY Tons. Cwt	TOTAL. Tons. Cwt.
WYOMING REGION.			
Franklin Coal Co	.....	.....	.....
Audenreid	.....	50 06	50 06
Lehigh & Susquehanna	.....	.....	.....
Germania Co	320 05	2,683 04	3,005 09
Wilkesbarre Coal & Iron Co	894 06	8,173 14	9,068 00
Warrior Run	424 07	3,438 02	3,862 09
Parrish & Thomas	1,604 07	13,159 01	14,763 08
New Jersey	496 11	3,347 02	3,843 13
Union	134 11	1,568 13	1,703 04
Wyoming Coal & Transportation Co	89 08	3,025 05	3,114 13
Newport C. C	.....	.....	.....
Morris and Essex Mutual C. C..	.....	749 02	749 02
Consumers	.....	.....	.....
Everhart C. Co	.....	.....	.....
Plymouth C. C	.....	152 14	152 14
H. B. Hillman & Son	120 18	1,911 02	2,032 00
Bowkley, Price & Co	.....	149 08	149 08
Mineral Spring	171 07	2,668 04	2,839 11
Valley Coal Co	.....	.....	.....
Enterprise Colliery—J. H. Swoyer	518 03	4,966 08	5,484 11
G. B. Linderman & Co	.....	.....	.....
Washington C C	.....	.....	.....
West Pittston	.....	.....	.....
Barclay Coal Co	.....	.....	.....
Shawnee	165 18	1,663 14	1,829 12
Consumers Coal Co	.....	827 05	827 05
Harvey & Bro	49 18	855 10	905 08
Wyoming Valley	212 08	340 12	553 00
Other shippers	.....	.....	.....
Total Wyoming	5,204 07	49,729 06	54,933 13
B. M. REGION.			
New York & Lehigh	.....	8,918 17	8,918 17
Honey Brook	2,720 04	19,671 07	22,391 11
German Penna. Coal Co	1,132 04	6,579 04	7,711 08
Spring Mountain	2,802 05	14,223 19	17,026 04
Coleraine	1,828,09	9,602 19	11,431 08
B. Meadow, D. W	.....	.....	.....
John Connery	.....	.....	.....
Lehigh Zinc Co	.....	.....	.....
Spring Brook	.....	.....	.....
Other Shippers	4 17	68 14	73 11
Total B. M. Reg	8,847 19	59,065 00	67,552 19
HAZLETON REGION.			
Central Coal Co	.....	.....	.....
Ashburton Co	.....	142 17	142 17
Mount Pleasant	47 07	3,890 10	3,937 17
Hazleton	2,477 10	40,867 00	43,344 10
East Sugar Loaf	1,973 04	27,181 17	29,155 01
Mount Hell	.....	219 14	219 14
Latimer (A. Pardee, Jr., Bro. & Co)	685 07	5 543 11	6 228 18
Stout Coal Co	492 15	3,796 01	4 288 16
Harleigh	553 15	11,810 18	12,364 13
Ebervale C. Co	1,578 11	13,379 10	14,958 01
Jeddo (G. B M. & Co)	1,290 00	26,381 16	27,671 16
Woodside, J. C. Co	913 17	1,980 03	2,894 00
Highland Coal Co	1,190 00	13,892 01	15,082 01
Cross Creek	375 09	3,804 18	4,180 07
Council Ridge	1,525 17	19,295 12	20,821 09
Buck Mountain	2,925 14	9,508 03	12,433 17
Other shippers	.....	.....	.....
Total Hazleton	16,029 06	181,694 11	197,723 17
UPPER LEHIGH REGION.			
Upper Lehigh Coal Co	1,317 07	13,540 16	14,858 03
Total U. L. Reg	1,317 07	13,540 16	14.858 03
MAHANOY REGION.			
Trenton Co	.....	.....	.....
Mount Etna	.....	591 00	591 00
Mahanoy Colliery	742 14	5,828 18	6,571 12
Delano	.....	.....	.....
Glendon Colliery	761 12	5,973 09	6,735 01
Primrose Colliery	.....	550 05	550 05
E. S. Silliman	2,432 02	22,133 09	24,565 11
McNeal Co	1,166 05	3,617 18	4,784 03
Knickerbocker	1,206 16	8.851 04	10,058 00
Thomas Coal Co	539 08	3,119 11	3,658 19
Williams & Herring	196 04	1,583 11	1.779 15
New Boston C. C	654 02	6 123 02	6,777 04
Shamokin C. C	.....	.....	.....
Caledonia M. and M	590 11	3,652 05	4,242 16
Coal from Catawissa Railroad	.....	.....	.....
Other shippers	.....	15 13	15 13
Total Mahanoy	8,289 14	62,040 05	70,320 19
Grand total	39,328 13	366,069 18	405,398 11
Same time last year	25,998 03	193.176 04	219,174 07
Increase	13,330 10	172,893 1-	186,224 04
Decrease	.....	.....	.....

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, February 28, 1868

Schuylkill R. A., choice	$....@$....	Lehigh Broken	5 25 ....
" Ordinary	....	" Egg	5 25 ....
" W. A., Lump	....	" Stove	6 00 ....
" Steamboat	....	" Chestnut	4 75 ....
" Broken	....	Wilkesbarre Lump	5 00 ....
" Egg	....	" B'ken & Egg	5 50 ....
" Stove	....	" Stove	6 00 ....
" Chestnut	....	" Chestnut	4 75 ....
Lehigh White Ash Lump	5 75		

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R. A., Sch'kill	....	H. Heils, E. S'klin. Lorb	5 50 ....
Locust Dale W. A., "	....	New England Red Ash	$5 25 ....
Honey Brook Lehigh	5 50	Broad Mountain	5 25 ....
Harleigh " "	5 50	Wyoming	5 00 ....
Spring M'n " "	5 50	McNeal Co	5 50 ....
Sugar Creek " "	5 50	Locust Mount'n (Repplier)	6 00 ....
Ashburton " "	5 50	Duncan Red Ash "	6 00 ....
Fulton White Ash	5 50	W'barre Coal & Iron Co	5 50 ....
Stout	5 50	New Burgh Orrell Gas Coal	9 00 ....
Old Co's "	5 50	Despard Gas Coal	9 00 ....
Buck Ridge W. A., Sb'kin	5 00		

Dealers in these Coals may be found in our advertising columns.

At Philadelphia, February 2,8 1868.

Lehigh Lump and St'mb't.	$5 00@....	Schuylkill Chestnut	2 75 ....
" Broken and Egg	5 00	Locust Mount Lump and Steamboat	4 25 ....
" Stove	5 00	" Broken	4 25 ....
" Chestnut	3 75	" Prepared	4 25 ....
Schuylkill R. A. Prepared	4 25 4 50	" Chestnut	2 87 ....
" Chestnut	2 75	Lorberry Coal	4 25 ....
" W. A. Lump and Steamboat	4 25	Shamokin	4 75 ....
" Broken	4 25	Franklin, (Lykens Valley)	4 75 ....
" Egg and Stove	4 25	Broad Top	4 75 ....

Scranton Coal at Elizabethport, February 28, 1868.

(Corrected weekly by D. L. & W. R. R. Co.)

Lump	$4 25@....	Egg	5 00 ....
Steamer	4 50	Stove	5 90 ....
Grate	4 75	Chestnut	4 40 ....

Prices for Pittston Coal at New York, February 28, 1868.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton of 2240 lbs.	$5 40@....	Egg " " "	5 40 ....
Steamer, " " "	5 40	Stove " " "	5 60 ....
Grate " " "	5 40	Chestnut " " "	4 90 ....

Lackawanna at New York, February 28, 1868

Lump	$5 50@....	Grate	5 75@....
Steamer	5 50@....		

Lehigh Coal at Elizabethport, February 28, 1868.

Lump	5 50@....	Chestnut	4 50 ....
Steamboat and Broken	5 25	Stove	5 50 ....
Egg	5 25		

At Baltimore, February 28, 1868.

Wilkesbarre & Pittston W. A. by car	$5 50@5 75	From wharf or yard, 50c. to 75 per ton additional.	
Lykens Valley R. A. by car	5 80@	Retail, del'd, per 2,240 lbs	7 20@8 00
Sunbury & Shamokin R. or W. A. by car	5 50 5 75	George's C'k and Cumberland f. o. b. at Locust P't for shipping	....@5 00

At Havre de Grace, Md.

Wilkesbarre or Pittston, W. A., on board	$4 85@5 10	Sunbury or Shamokin, R. or W. A., on board	....@5 25
		Lykens V'y, R. A. on b'd.	5 60@5 85

The above rates are only nominal. Shipping at this port is suspended for the season.

At Georgetown, D. C.

George's Creek and Cumberland on board..... $....@ 4 50

Wilkesbarre Coal at Elizabethport, February 28, 1868.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump	$4 50	Egg	5 00 ....
Steamer	4 50	Stove	5 25 ....
Broken	4 75	Chestnut	4 50 ....

Ten cents additional on shipments from Jersey City.

Prices of Provincial Coals.

[CORRECTED WEEKLY BY LOUIS J. BELLOSI, JR., 43 PINE STREET.]

Duty $1.25 per ton.

Block House (on board)	$2 00 gold	Little Glace Bay "	1 87½ "
Gowrie "	1 75 "	International Co.'s "	1 75 "
Lingan "	1 75 "	Slack Coal B. H., "	75 "
Sydney "	2 25 "	" L. G. B.,	1 00 "
Pictou "	2 25 "		

Prices of Foreign Coals.

Duty $1.25 per ton.

Corrected weekly by PARMELEE BROS., 32 Pine Street, N. Y.

Liverpool Gas Caking	$11 00	Liverpool House Cannel	—@20 00
" " Cannel	14 00	" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD

Liverpool Orrel, screened	$18@20	Liverpool Cannel, scr'd	22 00@— —

per ton 2000 lbs. delivered.

Coal Freights.

(Corrected Weekly.)

From Elizabethport.

Albany	$ 90@— —	New London	1 50@ 2 00
Boston	3 25 3 00	Newport	1 75 2 25
Bridgeport	1 50 — 75	New York	55 60
Fall River	1 75 — —	Norwalk	1 50 — —
Hartford	— — — —	Norwich	— — — —
Hudson	— — — —	Pawtucket and towing	2 50 — —
Lynn	— — — —	Portland	3 25 — —
Middletown	— — — —	Portsmouth	2 50 — —
New Bedford	1 75 2 25	Providence	2 25 — —
Newburyport	3 00 — —	Salem	2 50 — —
New Haven	1 50 — —	Taunton	1 75 — —

From Washington, N. J.

Hackettstown	$ 58	Iron Dale	$ 1 19
Waterloo	81	Dover	1 24
Stanhope	90	Paterson	1 80
Port Morris	99	Pompton	80
Rockaway	1 32	Bloomfield	1 80
Denville	1 33	Newark	2 00
Boonton	1 44	Belleville	2 10
Little Falls	1 70	Communipaw	2 10
Drakesville	1 08	Jersey City	2 20
Dickerson's Basin	1 11	New York	2 20

Foreign Freights.

New Castle and Ports on Tyne..... £16 keel.
Liverpool..... 11s. 6d.@12s. 6d. ton

BOSTON STOCK MARKET.

BOSTON, Feb. 28, 1868.

Prices bid to-day were as follows:

Bos. Hart. and Erie RR	15¼	Rockland	— ¾
Calumet	—	Cary Improvement	7½
Franklin	14	Isle Royal	—
Hecla	35	Minnesota	3
Copper Falls	21¾	Quincy	25
Hancock	5¼	Water Power	20

Sales at Boston Stock Exchange, February 27.

100 shs	Water Power		20¼	25 shs	Copper F'a		22
200	do	Bos. Hart & E	14¾	15	do	Franklin	14
300	do	do	15	109	do	Pontiac	50
500	do	do b.30	15⅛	50	do	Hancock	5¾
100	do	do b.60	15⅜	50	do	Pewabic	9¾
150	do	do	15⅛	100	do	Waverly	1¾
400	do	do	15¼	SECOND CALL.			
300	do	do	15⅜	250	do	Boston., H & Erie	15¾
550	do	do	15¼	200	do	" b.30	15⅜
200	do		15⅜	50	do	"	15¼

SAN FRANCISCO STOCK MARKET.

A telegram from San Francisco, dated February 26th, to Messrs. LEES & WALLER, Bankers, 33 Pine street, this city, quotes Nevada silver and other stocks as follows:

STOCKS.	Bid per ft.	STOCKS.	Bid per ft.
Gould & Curry	630	Belcher	310
Savage	3,500	Imperial (per share)	255
Chollar Potosi	210	Alpha	1,450
Ophir	160	Kentuck	285
Hale & Norcross	....	Cal. Steam Navigation Co	74
Crown Point	1,800	Cal. State Telegraph Co	30
Yellow Jacket	1,225	Greenbacks	..

London Weekly Metal Report.

LONDON, E. C., Feb. 7, 1868.

We have to report a little more animation in the metal market here, with a slight advance in the price of some articles. The trade, however, remains depressed; prices are still irregular. A moderate amount of business is reported in Scotch pig iron, at 52s. 3d. cash.

IRON.—Welsh and Staffordshire manufactured continue in moderate demand; prices are still irregular. A moderate amount of business is reported in Scotch pig iron, at 52s. 3d. cash.

COPPER.—Little business reported in English manufactured. Tough and tile are somewhat steadier in price. Australian remains quite nominal at the advanced quotations. Chili bars are quieter, with sellers, at £69. 10s, in Liverpool.

TIN.—We have to report a more animated business in Straits at the advanced price, transactions having been reported at the following prices, viz:—From £87 to £88 cash, and from £87 10s. to £88 10s. to arrive. Banca remains nominally a £91. The Dutch market is firm at 52fl. English tin unaltered.

TIN PLATES look decidedly better.

LEAD in moderate demand; prices a shade stiffer.

SPELTER.—A few small sales reported of common Silesian in London, at £19 17s. 6d. and £20. Special brands, £20. 5s. Outport Spelter is very scarce, and would command exceptional prices from £20 10s. to £21 5s., according to brands, but sellers are not to be met with. VON DADELSZEN & NORTH.

American Concrete Building Stone.

Recent improvements in the manufacture of concrete building blocks have so far perfected the product as to bring this stone into successful competition with the very best of the natural and artificial building materials. The action of lime upon silica, forming a silicate of lime, and thus binding together particles of sand, as in mortar, has been known from the remotest ages, and concrete walls of great antiquity are now standing, vieing with the natural rock in hardness and durability. Some years since a concrete block compacted by pressure was brought out in this country and used to some extent as a building material, but the slowness of the induration and uncertainty in the product hindered its general introduction. The improvements referred to consist in the use of heat in connection with quicklime and sand, by which the formation of the silicate of lime is hastened, and the same effect which formerly took years to be consummated, is now produced in a few days. Ground quicklime is thoroughly mixed with clean, sharp sand, and is then subjected to the action of either superheated or high pressure steam, which slacks the lime and causes it to attack the silica. This process continues for from twenty minutes to ten days, according to the degree of heat employed, when the material is molded and compressed by a heavy steam hammer, into blocks of any desired form. The ordinary building block made by this process is ten inches wide and four inches deep, having a hollow space in the centre six inches long by one inch broad; when the blocks are placed upon each other, so as to break joints, a continuous and connected series of air chambers will be formed within the wall. Thirty days exposure of the block, after it is first formed, to the air produces an induration quite sufficient for all ordinary building purposes, but the block continues to harden for an unlimited period. A church built entirely of this material was recently dedicated at Morrisania. A number of fine buildings have already been constructed of this material in Chicago, among which may be mentioned a handsome block of dwellings on Sixteenth street, and the Young Men's Christian Association of the same city, which was recently burned. The endurance of this stone when submitted to repeated freezing and thawing is quite remarkable, and experiment proves it to be equal in this respect to granite.—*N. Y. Tribune.*

☞ There are 1,568 lakes in Maine, some of which are from 1,200 to 2,000 feet above the level of the sea. It is claimed that no other area of extent in the world possesses so much water power.

☞ Gen. W. S. Smith is blasting rocks in Eagle Harbor, Michigan. He sinks a barrel of powder against a rock and explodes it by electricity, using no fuse and drilling no holes.

☞ It has been legally decided in England that a stamped facsimile of a signature bears the same value as the written one.

AMERICAN

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R. W. RAYMOND, EDITOR.

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☞ The American JOURNAL OF MINING has a larger circulation than any other paper of the kind in the United States.

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NEW YORK, SATURDAY, FEBRUARY 29.

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THE CONCENTRATION OF ORES—II.

The object of concentration is the separation of the valuable parts of the rock extracted in mining from the waste or gangue, for the purpose of diminishing the difficulty and expense of their reduction to merchantable form. In some cases it is also desirable to separate the valuable ores still further, in order to subject each class to the most suitable method of reduction. The rudest kind of concentration is sorting by hand; and where the character of the mine-product permits this to be done with reasonable ease and economy, it should always precede the more elaborate processes of mechanical preparation. In most cases, however, we have to do, after sorting, with aggregations of various materials, which cannot be mechanically separated except by the use of proper machinery. This is the problem of concentration in its usual sense. Auriferous sands present the case in its simplest form, since they contain but two principal ingredients, one valuable and the other worthless, already separated by nature to a certain extent, and lying loosely together. When the material to be prepared is compact, as in the case of ores extracted from veins, the first step to be taken is the reduction of the problem to the simple form above mentioned, by disintegrating the mass until the different constituents are mechanically isolated. This process, generally carried on by crushing the solid material, is preliminary to the concentration, which consists in an absolute separation of the different parts according to their specific gravity. It has been attempted to do this by dry concentration, that is, by allowing the different substances to settle according to their density in air, or by blowing away the lighter substances. The fanning of grain is a dry concentration. But the branch of this art which is universally practised, and which may claim to be thoroughly established in science and experience, is humid concentration, or the arrangement of the substances to be separated by means of water. The consideration of crushing and humid concentration, therefore, naturally occupy the greater part of Mr. KUSTEL's new treatise on this subject. Before discussing, however, the manner in which he has handled these topics, we propose to devote a few words to the nature of the advantages offered by the concentration of ores, and the rules which should govern the choice and application of a process of this kind.

The advantages of concentration may be metallurgical or economical, or both. When an ore of galena is intermixed with a large proportion of zinc-blende, for instance, the separation of the two is essential to a successful metallurgical treatment. We could name several eastern lead-mining companies who have found this out to their cost. On the other hand, the gangue mixed with an ore may be of such a character as not chemically to interfere with the metallurgical reduction, but its quantity increases the amount of fuel, flux and labor necessary to produce a given amount of merchantable metal. In other words, "the ore is not refractory, but it won't pay." Here the advantage of concentration may be said to be mainly economical. This distinction, we confess, is not strictly to be made; since the richness of the ore is metallurgically important, and *vice versa*, the metallurgical success or failure of treatment has to the capitalist a purely economical bearing. Nevertheless, the mining engineer must understand whether he is treating ores merely to "enrich" them, or also to remove from them deleterious ingredients, and the frequent blending of both objects in the one operation must not confuse his estimate of their relative importance.

Leaving out of view for a moment the chemical elements of the problem, let us inquire what is the real nature of the economical advantage sought. No doubt the elements of any ore could be extracted, weighed and sent into market "chemically pure," as the analyst does the work on a small scale in his laboratory, if the question of expense were disregarded; but this would not promote one whit the metallic industries. We often hear of processes which will "take all the metal out of the ore;" we have but lately seen scientific men recommending a new flux as one of the best that could be used "regardless of expense;" and the same error is repeated in less striking ways by many engineers, who think the process which is theoretically most complete, must be the most advantageous. The fallacy, once exposed, is universally recognized. The object of the arts of mining and metallurgy is primarily to make their operations pay. Science and civilization may gain indirectly; but self-interest is, and should be, the motive power.

The process of concentration is theoretically imperfect, since the separation effected is not even in theory a complete one. Practically, however, it may enhance the profits of mining, and even transform a ruinous undertaking into an assured success. Its central principle is the substitution of a cheap process for part of a dearer one, reducing the expense of the latter by a sum greater than the expense of the former. Concentration is therefore only to be employed in such cases and to such an extent as will render it certain to save more than it costs. It is a medicine, but not a panacea, and both the time and the dose must be properly adjusted. This may be illustrated by simple algebraic formulæ. Let $100x$=the crude ore annually extracted from any mine, l=the percentage of metal contained, m=the mining cost per ton, s=the smelting cost per ton of material sent to the furnaces, c=the cost of concentration from l per cent. to $l+r$ per cent., per ton of concentrated ore, and p=price received for merchantable metal per ton; then $plx-100x\ (m+s)$=the profit of one year's operations without concentration. The introduction of concentration involves an additional expense, c, for every ton of concentrated ore; but concentrating the ore from l to $l+r$ per cent reduces the quantity of material for smelting from $100x$ to $\frac{100lx}{l+r}$ tons. The profit of a year's operations with concentration$=plx-[100mx+\frac{100lx}{l+r}\ (s+c)]$. Subtracting the profit in the former case from this, we have $100x\ [s-\frac{l}{l+r}\ (s+c)]$ for the economical difference between the two methods. If of the two terms separated by the minus sign within the brackets the former be the greater, the advantage of concentration, at the cost and to the extent indicated, is established; but not otherwise. A certain copper mining company, for instance, is mining and smelting ten per cent. ore. The cost of smelting is eighteen dollars per ton of ore, and would be no greater (on the contrary, somewhat less) if the ore were richer. We will assume the smelting cost to be the same in both cases. The question is, whether a concentration of the ore from ten to sixteen per cent., at a cost of six dollars per ton of the dressed ore, would be economically advantageous. Introducing in our last formula $s=18$, $l=10$, $r=6$, we have

$s-\frac{l}{l+r}\ (s+c)=18-\frac{10}{16}\ (18+6)=3$ or a profit of three dollars on every ton of the original crude ore. In the same way, a simple substitution will show that, if the concentration cost eleven dollars a ton, or if, costing but six dollars, it only enriched the ore to thirteen per cent., there would be a loss per ton as compared with the direct process without concentration, of twelve cents in the former case, or forty-six cents in the latter.

This is not mere playing with equations. Many a mining superintendent adopts or continues a style of operations, which, reduced to formulæ, he would at once reject; as if he were under a spell, which the talisman of abstract symbols alone could dissipate.

THE UNIT OF POWER.

We find in the columns of London *Engineering*, one of the ablest and most attractive scientific journals in the world, an interesting discussion of a topic which has long commanded the attention of professional men—the rating of steam-engines as to power. Engineers are well aware of the defects of our present antiquated plan of classification, with its "nominal horse-power," "actual horse-power," and other incongruous absurdities. The cardinal fault of this plan is not one of nomenclature. WATTS' "horse-power" may be an inconvenient unit; but it is not, in the sense in which he used it, a vague or undetermined one. His experiments having led him to conclude that the average labor of a horse is the draught of one hundred and fifty pounds at the rate of two miles and a half per hour, he reduced this to foot-pounds, as a measure of power. One hundred and fifty pounds of force, exerted at the rate of two miles and a half per hour, or two hundred and twenty feet per minute, is the same as thirty-three thousand pounds exerted at the rate of one foot per minute, or, in other words, thirty-three thousand foot-pounds. The reason for selecting this unit is obvious. The steam-engine was introduced as a rival, not of water-power, but of horse-power; and its adoption depended upon the demonstration of its superior economy in the generation of force for purposes which had formerly been served by horses, or its sufficiency of power for purposes to which animals were inadequate. That battle was long ago fought and won. The "average horse" has retired from the unequal contest; but he still retains the empty honor of being the standard by which the strength of his victorious antagonist is measured.

In accordance with this definition, the actual horse-power of a steam engine must be the mean pressure in pounds on the cylinder piston, multiplied by the velocity of the piston in feet per minute, divided by 33,000. From this about 13 per cent. is deducted for working friction, and in condensing engines, a further deduction of 12 per cent. is made for the power required to work the pumps. The remainder is termed the actual horse-power of the engine.

It is evident, that the same engine, by varying the steam pressure and the speed, within the limits of safety, may be made to exert widely different degrees of actual power. The above calculation, therefore, only determines the rating of the engine, under the conditions which the builder or owner chooses to prescribe; and depends, moreover, much more on the boiler than the engine. Theoretically (and practically too, within the limits of safety and practicable speed) a small engine may show as many actual horse-powers as a large one. This classification affords therefore no constant or convenient method of comparison.

To supply this want, the notion of a "nominal horse-power" has been adopted. The nominal horse-power is a function of the size of cylinder and length of stroke. The theoretical unit here is the same as before—33,000 foot-pounds; but its use at all in this connection is a source of confusion and deception. The whole value of the term "horse-power," as *Engineering* well says, consists in its meaning exactly what it professes to mean, just as the value of a five-pound note consists in the certainty that it can be converted into coin to that amount. The estimate of the power of an engine by the diameter of its cylinder, which is only a single element, though an important one, in the calculation, leads to all sorts of mistakes. It is true that the actual power of steam-engines exceeds their nominal rating; but this excess is always expected by the purchaser, and if he overrates it in anticipation, his disappointment is not alleviated by the consideration that he has obtained more than the nominal power bargained for. The nominal power only relieves manufacturers from inconvenient guarantees, while it does not secure purchasers at all.

It is now proposed to introduce a new dynamic unit, called the "WATT equivalent;" and to drop entirely the old horse-power. One man suggests 1000 *second-foot-pounds* as the "WATT;" but this proposition is far short of meeting the difficulty. It is only a change of names. We shall have "actual Watts" and "nominal Watts," if this change is made; and there is no gain in that. The evil is plain, but the cure is not so easy. Let us have a new unit, a WATT; but let us wisely fix and clearly understand "wot's WATT."

SICILIAN SULPHUR.

MR. CHARLES N. ELLIS describes, in the London *Mining Journal*, the process of mining and refining sulphur, as carried on in Sicily. He says:

"Sulphur mines abound nearly all throughout Sicily, but, as the Sicilians have neither roads nor railways, those only are worked situate in the neighborhood of a port—that is, in a radius of 40 miles—because the transport comes too dear. The transport is generally carried on with donkeys or mules as far as a high road, and then by small carts, which hold from 10 to 14 cwts., or direct to the port, the carriage of which costs from 1-8 tari per cantaro of 175 rottoli (=1.75 cantaro ordinary).

"Sulphur mines are generally situated in the hills, being found and worked in the crudest manner possible. If, from indications of sulphurous water or other appearance, a man supposes there is sulphur, he begins to dig a hole. If he is successful in his search and finds sulphur, well and good; if not, he gives it up. Should he be successful, he hires a capomaestro (*i.e.*, a master who has apprentices under him, or young workmen), a sort of small contractor, with some five or seven lads, who digs out the hole, and the boys carry away the thrown-out material in small baskets on their shoulders (containing from 30 to 40 lbs). The ore is dug out, and when a sufficient quantity is thus obtained a ring of stone is first built, from 20 to 50 feet in diameter and 10 feet high, with a slanting floor. This is then filled up with a very high cone with ore. It is then thatched with earth outside. This is termed a 'calcarone.' It is then set fire to at the top, and burns downward. When it has burnt for about a fortnight they then tap it at the bottom, and let the sulphur run out into forms made of wood—rinsed out with water (the water answering like buttering a pie dish, &c.), and you can turn it out when cold without sticking to the mould—called 'battate,' of about 1 to 2 cwts. each. There are, of course, large mines, where 70 to 100 capimaestri are employed with their boys. If water is met with, a drain is either built under the mine (which is very expensive), or it is pumped out with drums, which is very inadequate, consequently most mines with water are given up."

This rude system of mining and metallurgy is not calculated to build up a steady business for Sicily. The earthy ores treat-

ed by the *calcarone* lose more than one-third their sulphur during the process, since the combustion of the calcarone takes place at the expense of a portion of the sulphur. The persons engaged in mining do not own the mines, but lease them from rich nobles, who live in Palermo, and pay no attention to the matter, except to draw their annual per centage of the profits. There is consequently no one to care for permanent improvements in buildings or processes. Immediate profit, at whatever cost, is the aim of the mining operator. He sells sulphur at a sacrifice to obtain payment in advance; he pays exorbitant freights in kind to avoid the outlay of money, and he takes care not to invest in "improvements" anything which he can pocket as dividend. If the resources of Sicily were energetically and systematically developed, she might continue to supply the world with one of the most important materials of chemical manufactures. But the natives of the island do not seem to be equal to the work; and there is little encouragement for foreign capitalists to venture into such a field, though Mr. ELLIS recommends the enterprise. English manufacturers of sulphuric acid and soda ash are falling back on pyrites as the most steady and reliable source of supply for their purposes. Pyrites is sent from the Hudson River Copper Mine, near Peekskill, N. Y., all the way to Liverpool, to be sold at fair profit, for a price which makes it cheaper than Silician sulphur to the manufacturer. We hope, for the sake of American chemical manufactures, that there will soon be a home market for such ores, and that we, as well as our British brethren, shall be emancipated from dependence upon the shiftless, wasteful and irregular industry of Sicily.

THE NATIONAL SCHOOL OF MINES.

Mr. STEWART, from the Senate Committee on Mines, has reported the bill to establish a National Mining School, with amendments, one of which provides that the bullion tax, to be set apart for its endowment, shall be that collected west of the eastern base of the Rocky Mountains; and another designates the following persons to constitute a Board of Directors, from July, 1868, to July, 1870, viz.: Messrs. SHERMAN DAY and W. ASHBURNER, of California; F. A. TUTTLE and D. W. WELTY, of Nevada; A. C. GIBBS, of Oregon; ———, of Idaho; A. J. SIMMONS, of Montana, and John PIERCE, of Colorado. At the expiration of their term, or in case of vacancy, Directors shall be appointed by the President, with the consent of the Senate, and said Directors shall receive no compensation except for actual expenses while attending to the business of the institution. The bill, it is said, will pass the Senate without serious opposition, and the most intelligent statesmen in the House are becoming convinced of the wisdom of the measure. Its success will be greater glory for Mr. ROSS BROWNE than the mission to China—though we wish him that, too, if he desires it.

Sulphurous Acid in Surgery.

A writer in the *Medical Times and Gazette* says he has found sulphurous acid of great service when applied to wounds, preventing the formation of pus, and promoting the speedy union of divided parts. He considers it superior in efficacy to carbolic acid, and free from the objections attending the use of the latter. Sulphurous acid has long been known as a most useful agent for checking organic decomposition and fermentation. It is used constantly in wine cellars for that purpose, and this new application of it in surgery would seem to be somewhat analogous to those which are already familiar to chemists.

New Gunpowder.

A London chemist by the name of EHRHARDT has patented a gunpowder in which the oxidizing ingredients are chlorate and nitrate of potash, and the carbon is mineral, not vegetable coal. He claims that it explodes, when confined and ignited, with greater force than ordinary gunpowder, but does not explode when ignited in the open air; that it is not much affected by dampness, and generates but little smoke in burning. The inventor uses, for blasting in coal mines, one part by bulk of the chlorate, four of the nitrate, and five of coal. For blasting granite, the respective proportions are one, two and three. We doubt the safety of this latter mixture. The chlorate of potash has been often tried as an ingredient of explosive compounds, but always excluded from general use by the danger involved. Of course, such a powder as this could not be used in loose blasts, nor for artillery purposes, in which case anthracite ashes (EHRHARDT uses red ash coal by preference) would leave a "pretty mess" in the guns.

Terrible Colliery Explosion.

A deplorable explosion occurred last month at the New Iserlohn mine, near Essen, Germany. A shift of about two hundred men were descending into the mine, and one hundred had already entered, when a dull detonation was heard, and a thick cloud of dust and smoke was ejected from the shaft. The fact of an appalling catastrophe soon became evident. Before nightfall seventy-five corpses had been drawn from the pit, and more were afterwards taken out. The whole number of the killed, at last accounts, exceeds eighty. Concerning the cause or occasion of the disaster, there is no definite information as yet, and perhaps there never will be any. In such cases, the culprits and the witnesses are generally "in one red burial blent."

The Annita Copper Mining Company.

The stockholders of this company hold their annual meeting on the 7th of March next, at the office, 10 Wall street, in this city. It may be remembered that the affairs of the Annita company were commented upon with considerable severity by this paper, on account of the silence of the officers concerning certain charges made in the newspapers. This reticence was construed as a confession of the charges brought. We await the full reports and statements which, it is said, will be forthcoming at the meeting referred to, and shall take pleasure in publishing the facts, and thus repairing any injustice which ma have been done.

NEW PUBLICATIONS.

THE ELEMENTS OF EUCLID AND LEGENDRE, *Simplified and Arranged to Exclude from Geometrical Reasoning the Reductio ad Absurdum; etc., etc. Adapted for Schools and Colleges. By* LAWRENCE S. BENSON, *Author of "The Truth of the Bible Upheld,"*—London, 1864; *"Geometrical Disquisitions,"*—London, 1864; *"Scientific Disquisitions Concerning the Circle and Ellipse,"*—1862; *Member of the New York Association for the Advancement of Science and Art; Hon. Mem. Phi Kappa Society, University of Georgia; Brothers' Society, Yale College, etc., etc.* [*All Rights Reserved.*] New York: Published for the Author by Davies & Kent, 183 William street, 1867.

This new treatise on Geometry and Trigonometry is highly recommended by the President of the Carolina Female College, by Prof. DOCHARTY of the College of the City of New York, and by the Section on Physical Science of the New York Association for the Advancement of Science and Art, which referred the subject to a committee, consisting of Prof. FOX and Prof. CLEVELAND ABBE. These testimonials are printed in the volume itself; and it is but fair to say, that, while they may be construed as an endorsement of the book, some of them will admit of a different construction, as endorsing merely the author's intention to write such a book, and not his accomplished result. Hon. S. S. RANDALL, City Superintendent of the Board of Education of New York, however, is still more positively committed in its favor, having made "valuable suggestions" to the author during its preparation, and also, it is said, recommended it for use in the public schools of this city, in consequence of which recommendation it has been adopted, though not, so far as we know, actually introduced.

The pretensions set forth in the title-page, and the force lent to them by such outside authority, must be our excuse for noticing the work at all. But having undertaken to examine its merits, we cannot do otherwise than judge it strictly. A text-book of geometry is not a thing to be hastily scribbled off, after the fashion of the modern manufacturers of school-books. It must be clear and precise in the use of language, logical in method, definite in plan, and accurate in demonstration. Mathematics is *the* exact science. Its achievements, so far as they have gone, are final; its rules are unchangeable; they cannot be debated like the canons of taste or the maxims of philosophy. A mathematical text-book which is defective in the qualities we have enumerated, outrages the genius and the history of the science, and should never be trusted or used. Mr. BENSON'S new Geometry is incurably, unspeakably bad in every one of these respects. It is obscure, loose, contradictory and ungrammatical in style, incoherent and illogical in arrangement, polemical and garrulous, not scientific, in method, and in several instances absolutely false in demonstration.

We do not fling out these epithets in lieu of evidence, but shall proceed to sustain them by proof from the book itself. First, as to style. There is not a page of decent English in the whole book. In a science where everything depends upon the exact use of language, a science, the study of which is chiefly valuable to most pupils for the training it affords in that particular, the young student is treated to such statements as these: "The term, 'each to each,' or sometimes 'respectively,' is a limiting expression, and is used to denote the equality of lines or magnitudes taken in the same order; *for*, without this qualification, two lines or magnitudes said to be equal to two other lines or magnitudes, *would imply* that their sums are equal, *when it would be desirous of meaning* that they are equal in the same order in which they are expressed" (p. 10). "One proposition is the 'converse' of another when, in the language of logic, the subject of the latter is the predicate of the former, and the predicate of the latter is the subject of the former" (p. 10). "'Proposition,' in geometry, *is a general term, expressing the subjects to be considered, and is either a problem or theorem*" (p. 11). "'Demonstration' consists in evident deductions from clear premises, *whereby the conclusion corroborates the premises, and shows the argumentativeness of the deductions*" (p. 11). "Any remark made from the demonstration of a proposition is a 'scholium'" (p. 11).

We have italicized the most remarkable portions of the above extracts; but we might as well have underscored the whole. They are all taken from two pages, on which we have marked a dozen other paragraphs, equally absurd. Take, for instance, the description (p. 10) of axioms, hypotheses, postulates, demonstrations, theorems, problems, lemmas, corollaries and scholiums, as "terms, expressive of certain facts or states of knowledge, by means of which the mind intuitively perceives a connection between the things known and those for elucidation." And again, as "the *data* by which the hidden truths are revealed." This turgid trash is presented as pabulum for youthful minds! To study it, and believe it to be mathematical language, would destroy the very conception of mathematics. The same incapacity of expression is manifested in the statement of many of the propositions. It is asserted, for instance (p. 168, prop. XVIII. Theorem) that "The sections of a solid by parallel planes are similar figures." This any housewife could contradict, who ever cut up a squash—an operation, by the way, not unlike that which we are now performing. The theorem applies to prisms and not to all solids, as Mr. BENSEN might have seen in LEGENDRE, where he got it. But he has "simplified and arranged" his matter. *Non tetigit quod non ornavit.*

With this cardinal defect, the book would be good for nothing, if the author were the greatest mathematician that ever lived. Its other faults are, however, still more serious. The method is not progressive nor scientific. There are frequent digressions for the sake of combatting previous authors, of whom a young student is not expected to know anything. A ludicrous instance of this polemic spirit occurs on the very first page, under the head of definitions, as follows: "Geometers define a *point*, position without magnitude; but to give a point position, would entitle it to the three dimensions of magnitude, whereas a point in Geometry expresses no dimension." This is the first and last attempt to define a point; and with this "definition" the student goes forward, to find the word point used, in the very sense thus disclaimed, throughout the book! There are long disquisitions here and there, which we charitably conceive to be reprints from Mr. BENSON'S former works, enumerated on the title-page. They do not belong here; but they are brought in as scholia—a scholium being, according to him, "any remark, made *from* the demonstration," etc. We have no space for the discussion of his arrangement of propositions; and hasten to consider what he deems the crowning merit of the book—its exclusion of the *reductio ad absurdum*.

This method of demonstration is quite as conclusive as any other, when legitimately used; and in fact it is often hidden in the forms of a so-called direct demonstration. For instance, when the equality of two magnitudes (not "lines or magnitudes," as Mr. BENSON says; since a line, by his own definition, is a magnitude,) is to be demonstrated, there is a continual *reductio ad absurdum* kept in reserve, as it were: certain lines are equal—that is, one is neither more nor less than the other: the length of one being laid off on the other, their extremities will coincide, because, if they do not coincide, one line must be longer or shorter than the other—a *reductio ad absurdum*. Axioms themselves depend upon the same reasoning. The whole is equal to the sum of all its parts, because it cannot be more and it cannot be less. It is true that geometers prefer, in demonstration, to prove a positive rather than a negative, but no one can escape the implied negative. Above all, the logical force of the *reductio ad absurdum* cannot be denied. Mr. BENSEN says he has excluded this method from geometrical reasoning, "because any *true* proposition is susceptible of being *directly* demonstrated;" and arguing from this *assertion*, he rejects the proposition of Euclid, that the area of a circle is equal to the rectangle under its radius and a straight line equal to half its circumference, *because* Euclid established that proposition by the *reductio ad absurdum*. But other geometers have proved it by the direct method (see DAVIES' LEGENDRE, Book V., Prop. XV.), and the highest analysis corroborates the demonstration. Mr. BENSEN'S crotchetty logic leads him to the following remarkable results: "Archimedes has shown that the relation of diameter to the circumference of a circle, expressed in numbers to be as 7 to 22—which is practically correct" (p. 140). "The area of a polygon is the rectangle of its apothem and its semi-perimeter" (p. 140). "But the circle being formed by a *curve line*, the properties of *parallel straight lines* are not applicable to it; hence the reason is evident why the ancient geometers objected to the curve line being regarded as a polygon of a great number of sides" (p. 140).

Every one of these sentences is ungrammatical or inaccurate; the term *polygon* is used for *regular polygon*, and the term *curve line* for circle; but we accept the author's meaning, and shall waste no more time in exposing his faults of language. From these quotations, it appears that he considers the ordinary method of determining the area of a regular polygon to be correct, and accepts also the established ratio of the diameter of the circle to its circumference, but the area of the circle he puts in a different category. The ordinary formula, πR^2, he calls the "approximate area;" the exact area he obtains by "mechanical construction" (p. 141), by "geometrical confirmation" (p. 165), by "analysis" (p. 217), and by "illustration" (p. 263), and announces to be three times the square of the radius. We suppose that, having declared the properties of straight lines to be inapplicable to the circle, he feels bound to employ "circular reasoning" in these demonstrations. We cannot undertake to expose at length all the fallacies which he employs. The "mechanical construction" argument must be sufficient. It is as follows: "If a cube be mechanically constructed upon a base whose perimeter is 24.2487, it will be equivalent to a cylinder of same height, the diameter of whose base is 7. Now, when 24.2487 expresses the perimeter of a square, each of its sides will be 6.0621; and its area will be 36.75, or *three times square of the radius of the circle*. Hence we get by mechanical construction *less* than what is obtained by the *method of exhaustions*." This reminds us of the easy rule by which lazy boys in school sometimes "do their sums": "Take half the answer, and multiply by two." The number 24.2487 above given is all out of Mr. BENSON'S own head, and his fundamental proposition is false. The perimeter of the base of a cube equivalent to a cylinder of the same height with the diameter 7, is not 24.2487, but 24.814. But our patience fails, and we content ourselves with one more comparison between Mr. BENSON'S own conclusions.

He admits that the area of a regular polygon is correctly determined by the ordinary method. Now *by that method* the area of a regular polygon of sixteen sides, inscribed within a circle, is equal to 3.12 + times the square of the radius of the circle. Mr. BENSON must believe, then, that the inscribed polygon is greater than the circle, which he finds equal to *three* times the square of the radius! We confess that this is a *reductio ad absurdum*, which he would not recognize as a valid argument; but, after all, there is very little reduction about it. It is evident that Mr. BENSON avoids the *reductio ad absurdum* by adopting the *absurdum* itself, in the "direct way." He is welcome to the pleasure of contemplating his own fantasies; but we protest against the endorsement of his silly book by men who ought to know better, and its introduction into public schools, to pervert the English style and destroy the logical and mathematical faculties of the young.

MANUAL OF GEOLOGY: *Treating of the Principles of the Science with Special Reference to American Geological History, for the Use of Colleges, Academies and Schools of Science.* By JAMES D. DANA, M.A., LL.D., etc., etc. Revised Edition, Philadelphia, Theodore Bliss & Co. 1868.

The excellence of DANA'S Manual of Geology has been universally recognized, and approved by five years of ever increasing popularity and usefulness. A partisan treatise, defending the notions of a particular school, it is not. The views of Prof. DANA are of course reflected in its pages; but he has succeeded to a remarkable degree in presenting a summary of facts upon which all geologists can unite. The peculiar value of this manual, as the world has long ago acknowledged, is its use of American geological history as a basis for classification and illustration.

This feature was originally intended to recommend the work to American students, by adapting it to their wants; but it is equally well calculated to be of service to foreign geologists, who find in it the information concerning this country which they seek in vain in European books. On mere grounds of convenience and clearness, we think any one who has compared the European and American systems of geological nomenclature and classification, would prefer the latter. The simplicity and unity of our rock-series, together with the vast extent of their developments, render them the best alphabet with which to spell the mighty sentences of the story of the world. The skilled geologist must be

able to read that history in every land; but the learner may with great advantage begin his study of it here.

The present edition of DANA'S Geology differs from the former one in few particulars. Several annoying *errata* have been corrected in the text; a few paragraphs have been re-written (as, for instance, the article on mineral oil, in the Appendix); the latest results of geological research have been incorporated; and two new sections appear in the appendix, one on an Insect from the American Carboniferous formation, and one on the long-tailed or reptilian bird of Solenhofen,—both containing large illustrations.

There are many works on geology which the student should consult; DANA'S manual is one which he must possess.

Scientific Meetings.

POLYTECHNIC BRANCH OF THE AMERICAN INSTITUTE.

The regular weekly meeting of the Polytechnic Branch of the American Institute, was held last Thursday evening, Prof. Tillman in the chair.

EFFECT OF AN ELECTRIC CURRENT ON MOLTEN CAST IRON.

Prof. Fleury stated that the result of passing a strong current of electricity through molten cast iron, was such that it could be made directly into steel or wrought iron. The experiment had been lately made in Paris, and with great success. The Professor, however, claimed priority, as his original experiments date back six years.

RESOLUTIONS OF RESPECT.

Dr. Feutchwanger introduced resolutions of respect to the memory of the late Sam. H. Maynard, a prominent member of the Institute, which, after reading, were adopted. On motion of Dr. Rich, the Chair appointed a committee, consisting of Drs. Rich, Lowell and Feutchwanger, to draft some proper plan of action in regard to the recent demise of Sir David Brewster.

NAPHTHA AS FUEL.

A patent cooking-range was exhibited which makes use of petroleum of 70°, fed from a reservoir. The exhibitor, scoffing the general opinion that petroleum of the kind used was explosive, was particularly anxious to convince his hearers of their mistaken views, and offered to then and there test the truth of his remarks. Several members of the club refused to credit this statement, expressing the opinion that petroleum emits a gas which is always explosive, which was specially reaffirmed by Dr. Rich, as the result of six months' experiments by a committee of which he was chairman. An experiment in baking bread was made and accomplished in exactly thirty minutes, as had been previously claimed. This form of range has certainly all the merit attributable to convenience and cleanliness, but whether it is as perfectly safe as the exhibitor claimed, is a question his hearers seemed to think required further and more conclusive experiments. It makes its own gas for fuel, requires no stove-pipe, maintains a regular heat, and is more economical than wood or coal stoves.

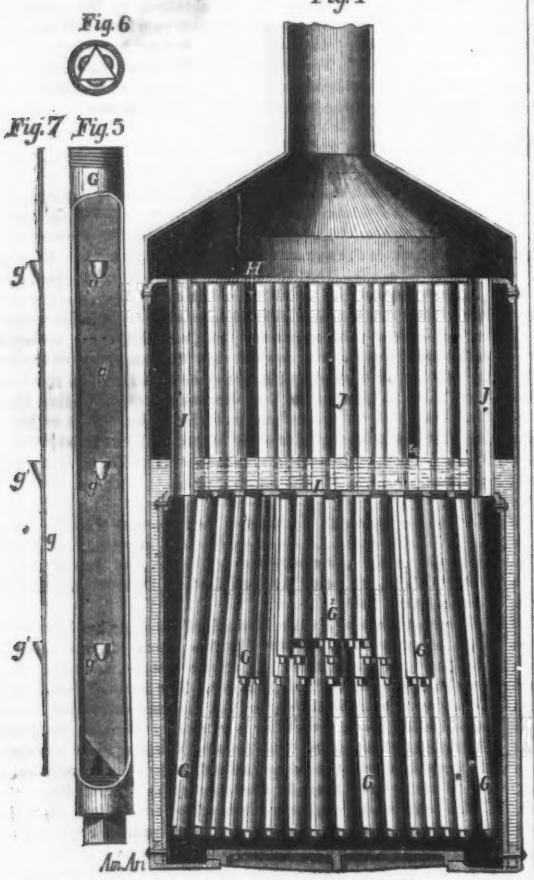
SUBJECTS FOR FUTURE MEETINGS.

The chair announced, that at the next meeting, Mr. Whitney would discourse on agricultural implements; and at the meeting of the subsequent week, Prof. Fleury would lecture on gold.

CLAPP'S PATENT BOILER.

We give, in the annexed cut, a section of a somewhat novel boiler. It is of the vertical kind, with both fire and water-tubes. On reference to Fig. 4, the reader will observe that the fire-tubes, J, extend from the crown-sheet of the fire-box up through the top of the shell, and the water-tubes G, G', G'',

Fig. 4



are pendent from the crown of the fire-box. The outer rows, G, G, of water-tubes extend nearly to the bottom of the fire-box, and surrounds rows of shorter tubes, G', G', and G'', G'', which are about half the length of the outer row. One of these water-tubes, detached from its position, is shown in Fig. 5, and is broken away to exhibit the arrangement provided for the circulation of the water. Fig. 6 is a tranverse section of the tube, showing the diaphragm, one of which is seen detached in Fig. 7, which are arranged so as to form a triangle when inserted in the tubes. In this way the water is isolated into thin films or sheets. so that the generation of steam will be very rapid—the diaphragm serving to establish return passages for water to supply the place of that converted into steam and that carried up by the steam. By the arrangement of openings g', g', much of the water lifted will be allowed to return to the return passage, without passing all the way up to the top of the tube. When fresh water is not convenient, dirty or salt water may be used in this boiler, and steam can be generated from cold water in five minutes.

This boiler was patented by M. R. Clapp, of the firm of Clapp & Jones, on January 15, 1867. It is applicable for general purposes, but perhaps more especially for steam fire-engines, as being of large capacity for making steam, which is of the highest importance in boilers connected with engines of that class. The steam fire-engine recently purchased by the Japanese Government from Messrs. Clapp & Jones, had a boiler that was constructed on the principle shown in the accompanying representation. The firm have their works at No. 455 Water street, New York city, and are constantly engaged in making first-class steam fire-engines, improved steam-pumps, and boilers for different purposes.

Manufacturing and Mechanical Notes.

No. VIII.

Organs.

The organ has been very properly designated the "king of musical instruments," since all others classified as string and wind instruments are inferior to it in mechanism and capacity for the production of musical tones. It seems to be an almost universal favorite with civilized nations, for the tourist finds it in the largest music halls, in stupendous cathedrals, as well as in smaller and plainer places of worship, in public school-houses and private school-rooms, in the parlors of amateurs and the sanctums of musical students. The compositions of Handel, Mozart, Beethoven, Bach and Haydn are now brought out in a manner that proves the intense interest taken in this instrument, and the unabated and refined taste for musical compositions by eminent composers. We presume that there are few musical persons who have not heard something of the magnificent English organs at St. George's Hall in Liverpool, at the Birmingham town hall, and at the York Cathedral, besides the many similar instruments in this country to be seen and heard in New York, Brooklyn, Philadelphia and Boston. These are, however, intended for large assemblies and trained choirs, for the performance of oratorios, masses, sonatas and fugues that require instruments of large compass and power, and which must be distinguished from the smaller organs now in such general use in school-houses and parlors.

Organs are of two descriptions, being constructed either with pipes or reeds. For the benefit of the uninitiated, we will explain that "reeds," as used in organs, are small pieces of sheet brass about No. 14 wire gauge, varying from two to five inches in length and from three-eighths to five-eighths in width. They have an oblong slot cut in them, which extends to within a short space of either end. A thin piece of sheet brass just fits into this slot, but overleaps at one end so as to admit of being riveted to the slotted block; this piece is termed the tongue. In pipe organs the sounds are produced by a pressure of air in metallic or wooden pipes, much on the same principle as a common whistle is sounded; but in reed organs the tones are obtained by exhausting the air from the *under side* of reeds, and allowing the air to pass *downward* through them by atmospheric pressure. In both cases the air is admitted by pressing down the ivory keys of the instrument; the sounds in the pipe organ thus come from vibrations of a column of air in tubes, and in the reed organ from vibrations of metallic springs. The invention of the "reed" is pretty generally conceded to the Chinese, though its origin is still a matter of some doubt. The introduction of free reeds into organ building dates back as far as 1810, but the accordeon, the progenitor of the melodeon, was not known until 1825. It was brought into England from Germany about 1828, but there is sufficient evidence to prove that it was known in the United States at least three years previous, the honor of the invention being awarded to Mr. J. H. Bazin, of Canton, Mass. America, therefore, may reasonably claim the invention of that weak instrument, from which has sprung one of the most useful and popular instruments of any time—the Melodeon or Parlor Organ.

In our present sketch we shall allude only to reed organs. The principal parts of a reed or parlor organ are the case, the action, a bellows, or, in reality, an air-pump, the key-board or manual, sub-bass pedals and bellows-blowing pedals.

The accompanying illustration represents one of the smaller parlor organs, manufactured by Carhart & Needham, and is named by them as the "Little Gem." Its appearance much resembles a pipe organ, but the tones are produced entirely from reeds. The gilded pipes, with the black walnut and rosewood case, give such instruments an exceedingly handsome appearance, and the construction of the "action" in these instruments is such that, without complicating the mechanism and without proportionally increasing the cost of manufacture, any number of reed sets may be combined from the diapason and principal of small parlor organs to the wonderful variety and capacity of a large instrument. The instrument represented here has a compass of five octaves, six stops, consisting of "manual sub-base," "vox humana," "tremolo," "octave coupler," "principal," "diapason," and "dulciana." It also contains the "combination swell and octave coupler." Its dimensions are: Length, 4 feet 1 inch; height, 7 feet 2 inches; width, 2 feet 3 inches; the entire weight, when packed for shipping, is 325 pounds. One of the largest instruments manufactured by Carhart & Needham contains as many as thirty stops, and has an elaborate black walnut case, 5 feet 10 inches long, 10 feet high, and 3 feet 6 inches wide. It has gilded pipes, two manuals, sub-bass pedals, and the stops placed in rows over the manuals, and therefore directly in front of the performer. The following is a synopsis of some improvements in reed organs, made more expressly for churches by Carhart & Needham. A new improved patent double-exhaustion bellows, whereby an ample and steady supply of air may be had with less exertion than heretofore; a "patent pneumatic stop," or "mute," which always insures a perfect closing of the stops; a new patent action which simplifies the internal mechanism, so that the reeds, valves, &c., may be easily and quickly removed and replaced by any person; an improved pedal, or sub-base, which is, as in large organs, independent of the key-board; the organ swell that produces the beautiful effects of *crescendo* and *diminuendo* as in large pipe organs; the "combination swell" that in organs having no pedal bass, and which are made with double-blowing pedals. This is so placed and combined with the bellows pedal as to rest lightly against the outside of the foot, and may be operated with perfect ease while in the act of supplying the bellows. It will be readily seen that by means of this invention the crescendo

and diminuendo may be produced at will perfect and complete. The stops in these instruments are arranged in a row above the key-board, within convenient reach of the performer, and are so named and numbered that the various combinations may be quickly made and changed. The "Grand Organ" stop commands the full power of the instrument, when drawn, and on being closed the original combination is restored. A novel feature in this class of instruments is the "Tremolo" stop, for solos and interludes. A new and valuable improvement is the power, in connection with the combination swell, of drawing on the stops one after the other, and of taking them off in the reverse manner. The same movement of the foot which governs the combination swell, brings on at will, one after the other, all the stops of the organ. The reverse action of the foot takes off the stops one by one, thus placing them under complete control of the player, by the simple action of one foot, and without withdrawing the hands from the keys at all. The Nos. 3 and 4 Church Organs, having a pedal bass, are furnished with an independent pedal for drawing on and taking off the stops. Each instrument is provided with a lever, or "blow-handle," so that a second person may supply the bellows, if desired. A "tell-tale," or indicator, is placed above the "blow-handle," indicating the amount of air exhausted and replaced, by observing which the person supplying the bellows will be enabled to do so with ease and uniformity.

These church and parlor organs are pleasing in appearance, owing to their architectural proportions, and the excellent taste and finish displayed upon them. They are becoming excellent substitutes for the larger pipe organs, as organs are now made with reeds giving a sixteen and thirty-two feet tone, these being the sizes of the largest pipes in a pipe organ. The number of stops has also been increased to such an extent that the organist of to-day can have in his own residence, at a comparatively trivial outlay, an instrument so much resembling the larger pipe organ that he need not repair to the church or the hall for practice, but under his own roof study and enjoy the compositions of eminent composers. Much has been done for this description of organ by the persevering industry and mechanical ability of Mr. Jeremiah Carhart, who has invented and patented some most valuable mechanical devices for the construction of reed organs. Carhart & Needham's manufactory in Twenty third street, New York, has a front of over 150 feet, with a depth of 32 feet. It is six stories high, and is fitted up with ingenious and beautiful machinery, nearly all of which is the invention of this firm, and used by them exclusively. The engine and drying rooms, and lumber, are detached from the factory, and occupy a large space in the rear. They have supplied to the homes of America some fifteen thousand instruments of all classes, and among them a large proportion of the great Library Organ, each of which counts for about fourteen of the lesser kind, and are making now, on an average, forty reed instruments per week. The long business career of Carhart & Needham has rendered their house popular with the public, and their beautiful instruments have won the approval of the leading organists of the country for their thoroughness of workmanship, beauty of voicing and completeness.

Mining on Lake Superior.

Twenty years ago the business of mining for copper on these shores was in its infancy, and the knowledge that iron ore existed in inexhaustible quantities, was barely known. A large number of Government permits, or leases, had been issued prior to that date; companies organized, and some sparse white settlements formed, though but little progress had been made beyond signatures on paper and superficial surface exposures. In those days locations, and in some instances sales thereof, were made with little reference to the existence or absence of mineral.

The hopes of many of the early investors in this country had nearly died out, and others were fast waning, when new life and vigor was again infused by the unparalleled richness of the Pittsburgh & Boston (Cliff) Mine, of Keweenaw county. This company was originally composed almost exclusively of Pittsburgh men, who visited the country and made their

own selections of land—their purchases being made for legitimate mining purposes, without reference to speculation therein, save that which should arise from the intrinsic merits they might subsequently develope. This policy has been steadily pursued in the control of the Cliff mine, and it is but simple justice to say, that it has been longer on the list and gone higher in the scale of dividend-paying concerns than any of its cotemporaries here. Would that I could impress on the minds and ingraft into the policy of those now owning and controling valuable mining tracts in this country, the expediency of a similar course. I but reiterate the opinion of a majority of the best mining men on the lake, when I say that the success of our dividend-paying mines is not owing solely to their being richer than many of the less fortunate class, but chiefly to the fact that they have been mined with a view to the legitimate results that have followed, and not as stock-jobbing concerns. The want of this inflexible purpose, to mine for the sake of mining, has been the bane, the ruin, of many hopeful enterprises in this and other more western mining districts.

In other instances, the want of knowledge of the means actually required to open a copper mine, has constituted the rock on which the frail bark has foundered. No company should engage in this business with less than $200,000 paid-up capital; for though a few of our best concerns have reached a self-sustaining basis, on a little over half this sum, "when this old hat was new," yet a great many others have been swamped for the want of more Indeed it seems next to impossible since the extreme speculative era of 1864, and its accompanying evils, to make more than a decent beginning toward opening a mine on what used to suffice for the entire job. Last, but not least, among the evils I shall enumerate in this communication, is one to which much of the present *flatness* in mining stocks is to be attributed, viz.: the over-issue of shares in several of the prominent companies on the lake. Those with which we formerly contended, were enough to discourage capitalists from investing here, but this last move has alarmed them to an extent never before known. And this result is as natural as effect from cause can make it. If such rascality can be practised, and its perpetrators go unwhipped of justice, what security has any one that his investment may not be rendered entirely worthless at any moment. We may rest assured that no tariff on foreign ores, however high, will remove the incubus which such transactions place us under.

SPECTATOR.

Foreign Mining and Metallurgy.

We have some interesting statistics at hand in illustration of the mining and metallurgical production of Prussia in 1866. The statistics for 1867 not being yet made up, the figures which we now reproduce are the latest available:

	Production.	Value.
Coal.....Tons	18,628,548	£5,236,969 0 0
Lignite.....	4,900,432	686,548 0 0
Minerals of various kinds.....	.....	1,584,951 0 0
Pig.....	730,816	2,756,905 0 0
Rough pig.....	45,636	214,808 0 0
Casting pig, first fushion.....	27,601	224,314 0 0
Heavy iron.....	387,409	3,702,945 0 0
Rough steel.....	29,253	432,675 0 0
Zinc.....	60,195	1,140,642 0 0
Silver.....	28	259,426 0 0
Lead and litharge.....	31,127	559,645 0 0
Copper.....	3,230	280,597 0 0
Nickel.....	.....	55,890 0 0
Arsenic.....	.....	1 695 0 0
Antimony.....	.....	2,340 0 0
Mercury.....	.....	197 0 0
Cadmium.....	.....	28 0 0
Alum.....	.....	19,659 0 0
Copperas.....	.....	9,337 0 0
Sulphate of copper.....	.....	4,008 0 0
Sulphur.....	.....	1,511 0 0
Salt.....	243,890	241,470 0 0

The total value of the mining and metallurgical production of Prussia in 1866 was, therefore (massing the three totals of £7,510,748, £3,196,030 and £2,576,443 together), £13,283,221. The number of workmen engaged in 1866 in the Prussian mines of coal and lignites was 103,976; in the other Prussian mines, 44,323; and in the ironworks and saltworks, 81,305, making a total of 229,604.—*London Mining Journal.*

Patent Claims.

Interesting to Miners, Millmen, Metallurgists Oil-Men and Others.

74,564.—QUARTZ CRUSHER.—S. T. McDougall, Brooklyn, N. Y.

I claim combining, constructing and operating the pounders and followers, substantially as shown for the purposes indicated.

74,611.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York City. Antedated Feb. 6, 1868.

I claim, 1st, The combination of the mandrel, C, with the ram, A, said mandrel being rigidly connected to said ram in a deep cavity, as shown and described, so as to give said mandrel capacity to spring in said cavity, and to adjust itself in the centre of the die.

2d, Connecting the mandrel to the ram by the interposition of a flexible link, substantially as described.

3d, In combination with the ram, A, the cup, B, for the purpose of facilitating the connection between the mandrel and the ram, substantially as described.

74,612.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York City. Antedated February 6, 1868.

I claim, 1st, The formation of a metallic pipe, by forcing two or more of the ductile metals together, in the form of tubes, over a mandrel or core, out of two or more cylinders, and through, on, or in two or more ties, substantially as described.

2d, The use of two or more cylinders, two or more rams, and two or more dies, or their equivalents, when combined with a mandrel or core, substantially as described, for the purpose of making laminated pipe, whether said pipe be made of metal or other material.

3d, The manufacture of a metallic pipe, consisting of three tubes of soft metal, such as a tube of lead pressed between two tubes of tin, by forming and forcing them together, through three dies, out of three cylinders, over one core or mandrel, in the manner described.

4th, In combination with a pipe press, a set of drawing or stretching rollers, for the purpose of drawing or stretching the pipe on the mandrel or core, as it issues from the press, substantially as described.

5th, The manufacture of a continuous metal pipe, whether of lead or of composition, from metal disposed in two or more retaining cylinders, by forcing it out of the same in the ferm of two or more tubes, over a mandrel or core, and in such proportion that the retaining cylinders shall not both or all be exhausted at the same time, so as to avoid the defect in the pipe, resulting from the failure of the successive charges to thoroughly weld, as in the ordinary press, substantially as described.

74,613.—MANUFACTURE OF TIN-LINED LEAD PIPE.—William Anthony Shaw, New York City. Antedated Feb. 6, 1868.

I claim, 1st, Making the charge of metal in three distinct parts as decribed, and uniting them either before or after they are put in the cylinder.

2d, Making the central ingot or charge of tin, in the form of a double frustrum of a cone, or its equivalent, for the purpose of securing a uniform thickness of tin in the lead tube or pipe.

3d, Making the intermediate lead or alloy ingot in the form of a frustrum of a cone, substantially as described.

4th, Making the cavities, D, in the upper end of the charge, substantially as described, for the purpose specified.

74,686.—EXTENSION COAL CHUTE.—Jacob Heatherington, Bellair, Ohio.

I claim the combination of the extension plank or rod, H, chute, G, rollers, h h r r, and extension beam, J, the whole constructed and operating substantially as and for the purse pospecified.

On-dit about Minerals, &c.

☞ Attention is being attracted to the subject of ditches and canals in the arid regions of the Rocky Mountains. Thousands of acres of superior land lie barren for want of water, and hundreds of miles of country have to be travelled without water, unless it is carried in tanks to supply the escorts and travellers. These lands can be made available, and the want of water obviated, it is said, by the construction of ditches. A company of citizens of New Mexico, organized under the general incorporation law authorized by Congress, have the right of way to make such a ditch for seventy miles at the place, where, some years ago, the company expended several thousands of dollars to make an artesian well, and failed. This company proposes to take water from a river where it is abundant, and carry it through a country that is now barren, but which, by irrigation can be made to produce abundant crops. A grant of alternate sections of land to aid in the construction of these artificial streams is asked for from Congress.

☞ An important patent suit is pending in the United States Court at Cleveland. It is brought by the Densmores against the Cleveland Oil Tank Company. James and Aaron Densmore obtained in 1866 a patent for a tank car for conveying petroleum in bulk instead of in barrels, as formerly, and charge the defendants with infringing by using two hundred cars like theirs, and sue for $100,000 damages. Nearly all of the crude oil is transported in tank cars like those of plaintiff's, more than a thousand of those being in use by various parties. If the patent can be sustained, and eminent counsel believe it will be, its value will be half a million. The case will occupy several days, and awakens great interest in the oil trade.

☞ A well of naptha has been discovered at Kudaca, in the Caucasus, by boring. At the depth of 274 feet from the surface the liquid was first struck, and for a whole month gave a supply of 1,500 barrels daily. Since then a fresh source has been met, which rises with irresistible force to the height of forty feet above the ground, the jet being four inches in diameter, and delivering a daily supply of 3,000 barrels.

☞ The iron and steel works at Birmingham, Conn., used 4,000 tons of scrap, last year, making 3,500 tons of finished iron, 350 tons of imported steel in carriage and truck springs, and made 1,000 tons of iron into axles of all grades and styles. They employ about 150 men, and are about to add to their business.

☞ During the year 1867 the total deposits of gold and silver at the San Francisco Mint amounted to $19,536,270.11; of which $18,923,152.17 was gold, and $613,117.94 silver. $19,370,534.92 was returned in gold and silver coin, and $20,534.02 in refined bars.

☞ A bed of hematite iron ore has been discovered at Sinking Spring, four miles from Reading, Pa. Parties have already sunk a shaft which passes through a solid bed of ore twenty-six feet in diameter.

☞ Prof. Lowe's machine for manufacturing ice has been completed by the Ames' company of Chicopee, Mass., and is said to be successful in its operation.

☞ An extensive deposit or ledge of mineral paint has been discovered near Virginia City, Nevada, where there are millions of tons to be had for quarrying.

☞ A superior hard coal has been found, it is said, in Raymond, Maine.

All Sorts.

☞ A rapid penman can write thirty words in a minute. To do this he must draw his quill through the space of one rod—16½ feet. In forty minutes his pen travels a furlong, and in five and and one-third hours one mile. We make, on an average, sixteen curves or turns of the pen in writing one word. Writing thirty words in a minute, we must make 480 strokes; in an hour, 28,800; and in a day of only five hours, 144,000; in a year of 300 days, 43,200,000. The man who makes 1,000,000 strokes with a pen in a month has done nothing at all remarkable. Many men make 4,000,000. Here we have in the aggregate a mark 300 miles long, to be traced on paper by each writer in a year. In making each letter of the ordinary alphabet, we must make from three to seven strokes of the pen—on an average three and a half to four.

☞ The records of the United States Court in this city for a number of years show that of the names of persons engaged in litigation in those courts a larger number commences with S than with any other letter in the alphabet. Second on the list stands the letter N. Taking the city directory as a guide for the comparative number of names commencing with each letter of the alphabet, we find S the largest, but no larger than B or W. The singular fact is that N is the smallest next to Q. Why the N's should be more litigious in proportion to their numbers we leave some one else to explain.—*Detroit Post, Feb.* 21.

☞ The Lawrence, (Mass.,) *Sentinel* says coal tar and broken stone have been used in that city for some time for sidewalks and street crossings, and it answers the purpose so well that in a few years it will be the only material used for that purpose in the city. Loaded trucks and other very heavy vehicles pass over the crossings at all seasons without indenting them in the least, and they grow harder and better as they grow older. The sidewalks are always hard, smooth and clear, and instead of being slippery, like brick and stone, they are as safe to walk on as a wooden floor; and the cost is less than that of any other known material. They neither crack, wear nor wash away.

☞ There is now in course of manufacture at a leather belting factory in this city, what is said to be the largest leather belt ever made. The width is 47 inches; length, 100 feet; weight, 18,000 pounds; and cost, $2,000. It is composed of triplicate layers of leather, making a thickness of three quarters of an inch, and cemented and pressed so firmly together that it has the appearance of one solid piece.

☞ A San Franciscoan has invented a means of propelling vessels without steam or sails. He connects three boats together in a line, and expects the two on the ends, by the rise and fall of the waves, to move the machinery in the central vessel, which shall propel all three.

AN INDUCEMENT.—Any party sending us three yearly subscriptions to the AMERICAN JOURNAL OF MINING, will receive a Craig Microscope free of charge, WESTERN & CO., 37 Park Row, New York City.

AN EXPERIENCED MECHANICAL DRAUGHTSMAN and Mechanic wants a situation. Address A. B., 5 Division street, Myrtle Avenue, Brooklyn, L. I. 8.tf

PLATINUM APPARATUS, SHEET, WIRE, etc., for all Laboratory and Manufacturing purposes. Platinum crap and ore purchased. H. M. RAYNOR, 21:5t Office, No. 748 Broadway, N. Y.

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OTIS, BROTHERS & CO., SAFETY HOISTING MACHINERY, feb15:6m 309 BROADWAY, N. Y. CITY.

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Apply at the MANHATTAN METALLURGICAL WORKS
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Wilkesbarre and Lehigh Coal,
FOR STEAM AND FAMILY USE.
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JNO. WHITE. LINDLEY H. FOWLER dec30 LOUIS T. SNOW.

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For Sale in Lots to suit.
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AGENCY OF GEORGE WRIGHT & CO., LIVERPCOL,
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ap22:1y

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On Wednesday, February 26th, 1868.
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The Delaware, Lackawanna and Western Railroad Company will sell, by MESSRS. JOHN H. DRAPER & CO., Auctioneers, at the Company's Salesroom, 26 Exchange Place, corner of William Street, New York, on WEDNESDAY, Feb. 26th, at 12 o'clock, noon,
50,000 TONS
of coal, from the Lackawanna regions, of the usual sizes, deliverable at their depot, Elizabethport, N. J., during the month of March, 1868.
Terms: Fifty cents per ton, payable in current funds, on the day of sale, and the balance within ten days thereafter, if required, at the office of the Company.
SAMUEL SLOAN, President.

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Delivered direct from the mines, or for reshipment at Port Johnston.
LOUIS J. BELLONI, Jr., Pres't.
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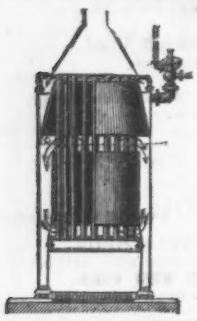

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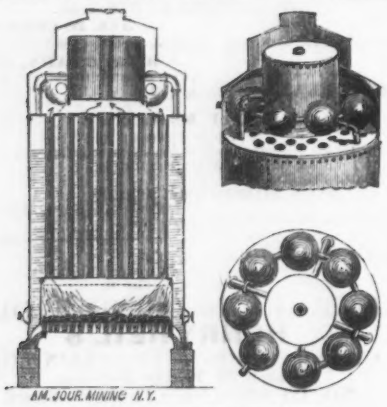

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Among the many in use would refer to two (75 horse each) now running the machinery of the New York Tribune.

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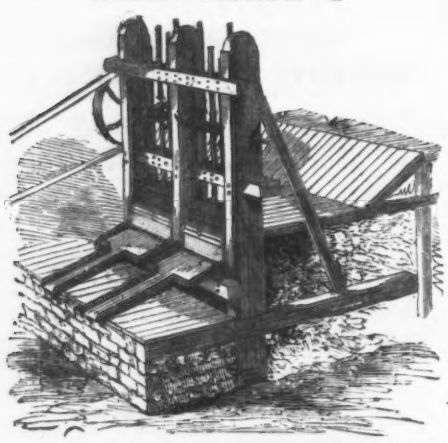

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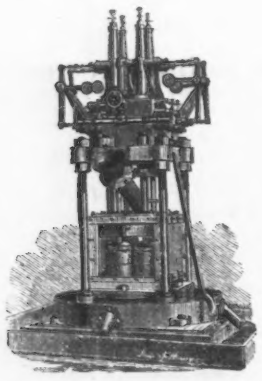

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STEAM STAMP-MILL COMPANY,

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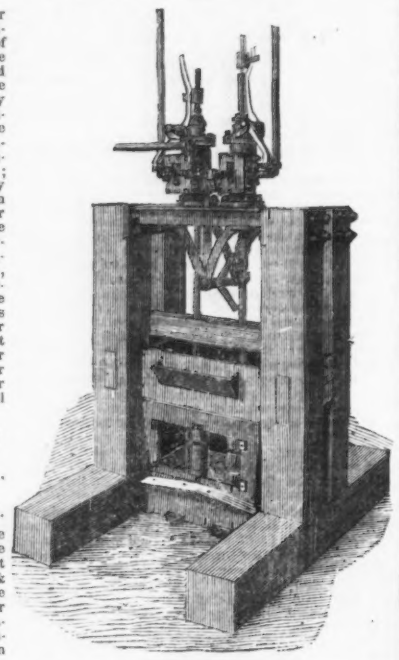

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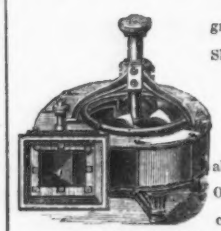

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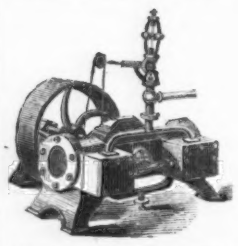

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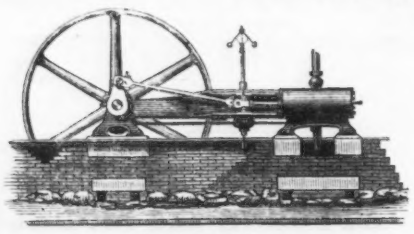

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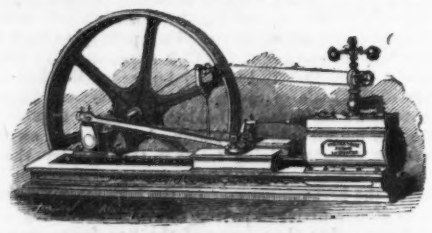

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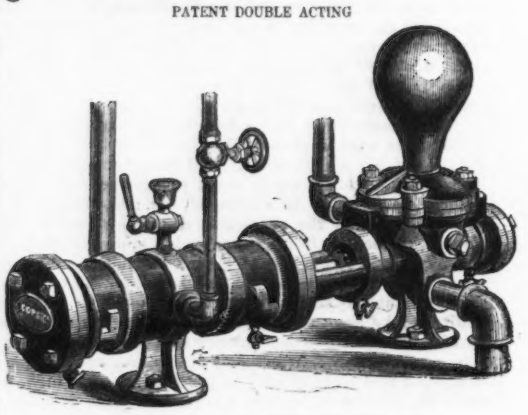

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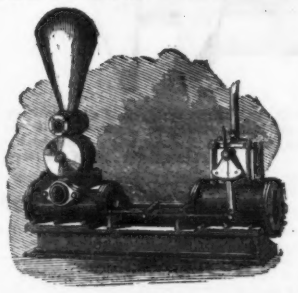

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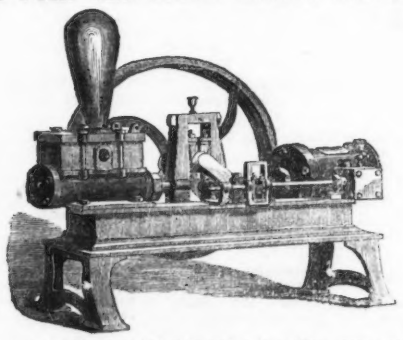

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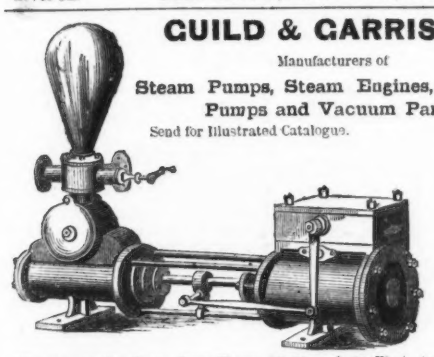

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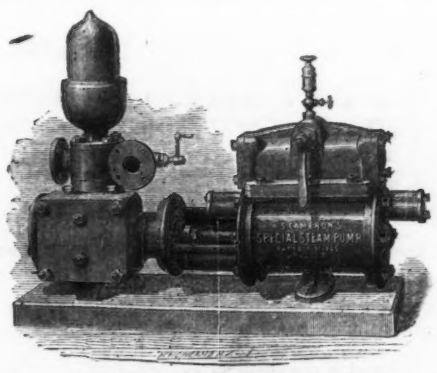

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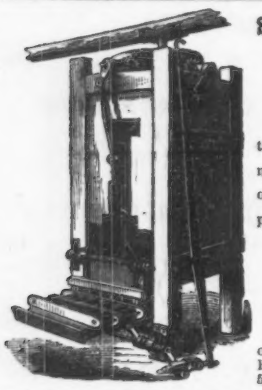

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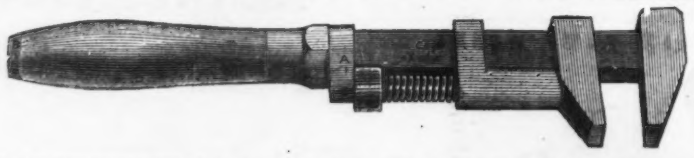

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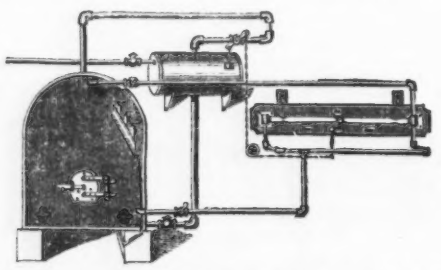

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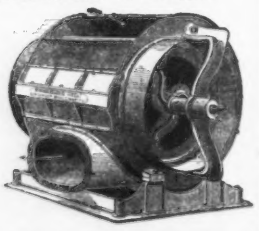

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Prof. Harper, New York, etc. oct12, '67:'68

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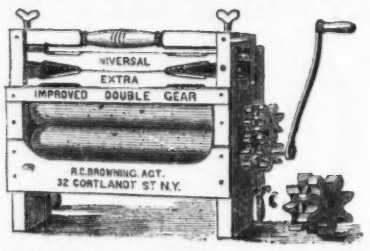

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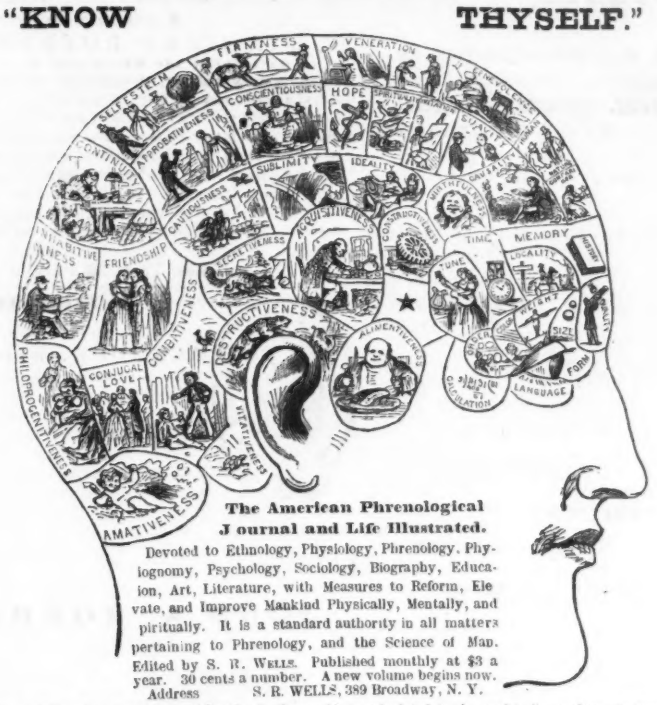

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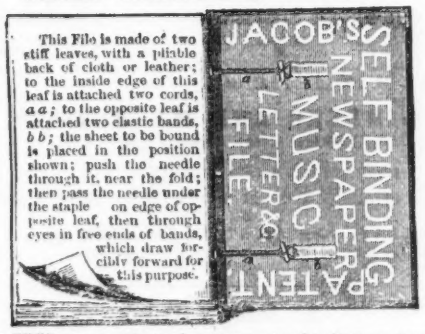

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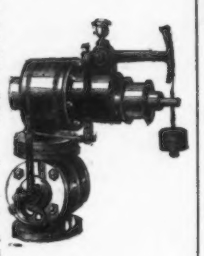

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